CHAPTER 2

LITERATURE REVIEW

This chapter presents the summary of the literature reviews on the quality health outcomes model, outcomes including job satisfaction of nurses, nurse burnout, and the quality of nursing care, system including nurses' work environment and nurse staffing levels. Finally, the conceptual framework of this study is presented.

The Quality Health Outcomes Model

The Institute of Medicine (IOM) has defined quality of care as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge. Including individuals and population in this definition draws attention to the various perspectives on quality that need to be addressed in models and measurement. In 1998, the Expert Panel on Quality Health Care of the American of Nursing published the Quality Health Outcomes Model (QHOM) as a conceptual framework for quality and outcome research. The QHOM was developed by modifying Donabedian's (1966) quality diagram that demonstrated a linear relationship between structure, process, and outcomes to include multiple-level analysis among client, providers, and setting. The model was a dynamic relationship between these constructs and posits client characteristics as an additional component (Mitchell et al., 1998). As presented in figure 1, the QHOM illustrates the interrelationships of four main constructs,

namely, system, intervention, client, and outcome. The effect of interventions on outcomes is thought to be mediated by system and/or client characteristics.

The system components refer to characteristics of the organization where care is provided or the provider, such as ownership, presence/absence of technologically advanced equipment, and skill mix of health care providers; the intervention components are direct or indirect activities taken by health care providers, such as administration of medications or the provision of education, to increase adherence to a medication regimen; the client components include traditional client demographic variables, physiology status, existing health problems, and socioeconomic status measures; the outcome components are the results of care structures and processes that integrate functional, social, psychological, physical, and physiological aspects of people's experience in health and illness, and may be individual or organizational measures (Mitchell et al., 1998).

The QHOM was developed as a conceptual guide for healthcare systems research from the expert panel members' ongoing research, experts' opinion, and the literatures of nursing and health services. It is important for nursing systems research because it incorporates essential components of nursing care characterized by structures and processes that integrate functional, social, psychologic, and physiological aspects of patient experiences during illness and when promoting health. It also contains all four components of what Fawcett termed the nursing metaparadigm (person, environment, health, and nursing) (Mitchell & Lang, 2004).

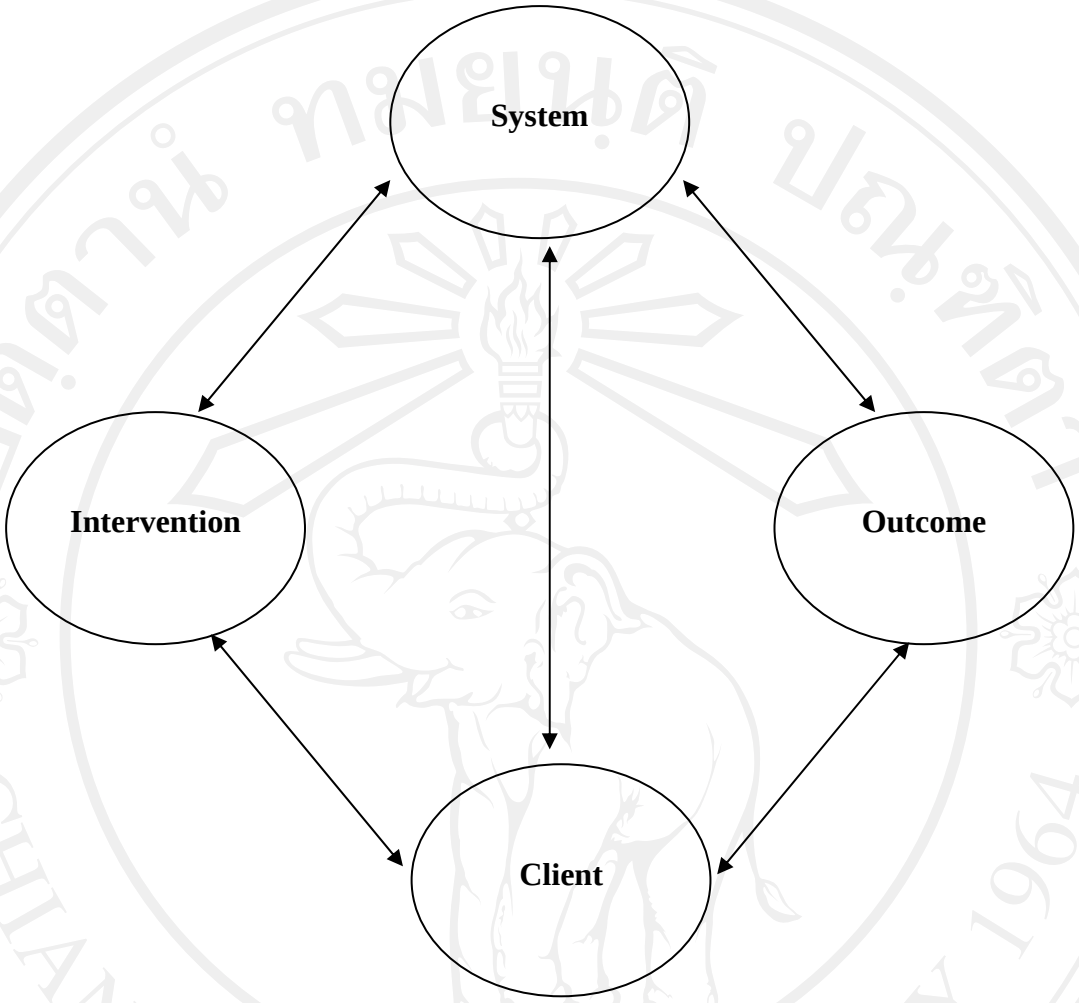

Figure 1. The Quality Health Outcomes Model (Mitchell et al., 1998)

The QHOM provides a broader understanding for outcomes research. A recent review of the literature demonstrated that the QHOM is useful to theoretically guide studies that evaluate system interventions to improve patient care and outcomes (Mitchell & Lang, 2004). Since the QHOM was developed, many studies have used it as a framework. Mayberry and Gennaro (2001) described the application of the Quality of Health Outcomes Model to obstetrical care, particularly second-stage labor. Researchers suggested that analysis of system, intervention, client, and outcome

components in the QHOM can provide a comprehensive picture of the complexity of patient care decision making in hospital labor and delivery units.

While the QHOM features numerous reciprocal relationships among interventions, systems, and client characteristics that affects outcome, the adapted model was created to provide a single, unidirectional approach for identifying independent and combined relationships between system and outcome variables. Several studies used the QHOM to display the linkage of system and outcomes. Vahey et al. (2004) examined the effect of the nurse work environment on nurse burnout, and the effects of the nurse work environment and nurse burnout on patients' satisfaction with their nursing care using the QHOM as the conceptual framework. The finding suggested that system effects outcomes.

Moreover, Newhouse, Johantgen, Pronovost, and Johnson (2005) identified the relationship between RN staffing factors in perioperative settings and surgical patient outcomes; complications, mortality, and length of stay. The patient, the system, and the outcome concepts of the Quality Health Outcomes Model were described as they relate to the study. The system and patient were theorized to have a direct effect on the outcome. Findings suggested that after adjusting for patient factors, selected organizational factors in perioperative settings had significant influence on patient outcomes. Similarly, Gerolamo (2006) examined the extant literature to determine if evidence supported the conceptualization of a physical restraint episode as an adverse client outcome that was sensitive to the organization of nursing care in psychiatric settings. An adapted version of the QHOM was used as the conceptual model to guide this inquiry. The findings demonstrated that evidence strongly suggested that a physical restraint episode was an adverse outcome that was

sensitive to the organization of nursing care. Recently, Borglund (2008) identified how type and extent of relationships between adults with disability (AWD) characteristics, case manager type, and case manager interventions affected the achievement of quality of life (QOL) outcomes.

According to this study, an adaption of the QHOM was used as the conceptual framework because it posits a temporal relationship among study variables and it is relevant to the study's purpose. Outcomes of interest are job satisfaction of nurse, nurse burnout, and quality of nursing care. System of interest includes nurses' work environment and nurse staffing levels. Those variables are presented on the following paragraphs.

Outcomes

Outcomes are something that follows as a result or consequence (Merriam-Webster Online Dictionary, 2010). In heath care field, outcomes are the consequences of the health and welfare of individual and of society (Donabedian, 1980). Similarly, outcomes are the results of care structures and processes that integrate functional, social, psychological, physical, and physiological aspects of people's experience in health and illness, and may be individual or organizational measures (Mitchell et al., 1998). Previous studies presented that job satisfaction of nurses and nurse burnout referred as nurse outcome, and quality of nursing care referred as patient outcome. The summary of job satisfaction of nurses, nurse burnout, and quality of nursing care are delineated as follows:

Job Satisfaction

Job satisfaction is a topic of wide interest to both nurses who work in organizations and nurses who study them. Organizations have significant effects on the nurses who work for them and some of those effects are reflected in how nurses feel about their job. This makes job satisfaction an issue of substantial importance.

Definition of Job Satisfaction

Job satisfaction is widely researched and researchers vary in their definitions due to different theories presenting different conceptualizations.

Maslow's Human Needs theory suggests that human needs form a five-level hierarchy ranging from physiological needs, safety, belongingness and love, esteem to self-actualization. Based on this theory, job satisfaction has been approached by researchers from the perspective of need fulfillment. For instance, Kuhlen (1963) defined job satisfaction as the individual matching of personal needs to the perceived potential of the occupation for satisfying those needs. Worf (1970) defined job satisfaction as need fulfillment, that is, whether or not the job met the employees' physical and psychological needs for things within the work situation. Similarly, Conrad, Conrad, & Parker (1985) defined job satisfaction as a match between what individuals perceive they need and what rewards they perceive they receive from their jobs.

In terms of Herzberg and Mausner's Motivation-Hygiene theory, job satisfaction is defined as a function of satisfaction with the various elements of the job (Herzberg & Mausner, 1959). The theorists constructed a two-dimensional paradigm

of factors affecting people's attitudes about work. They concluded that such factors as company policy, supervision, interpersonal relations, working conditions, and salary are hygiene factors. The absence of hygiene factors can create job dissatisfaction, but their presence does not motivate or create satisfaction. They found that the motivators were elements that enriched a person's job or determiners of job satisfaction: achievement, recognition, the work itself, responsibility, and advancement. These motivators (satisfiers) were associated with long-term positive effects in job performance while the hygiene factors (dissatisfiers) consistently produced only short-term changes in job attitudes and performance, which quickly fell back to their previous levels. This theory has dominated the study of nature of job satisfaction, and formed a basis for the development of job satisfaction assessment.

Focusing on the cognitive process (Spector, 1997), job satisfaction is the affective orientation that an employee has towards his or her work (Price, 2001). It is all the feelings that an individual has about his job (Gruneberg, 1976). It addresses perceptions and attitudes individuals have and exhibit regarding their work (Pope & Stremel, 1992).

Job satisfaction can be considered as a global feeling about job or as a related constellation of attitudes about various aspects or facets of the job. The global approach is used when the overall attitude is of interest while the facet approach is used to explore which parts of the job produce satisfaction or dissatisfaction.

Consequence of Job Satisfaction

Prior studies demonstrated that job satisfaction has been the primary predictor of intention to leave and actual turnover. Several studies presented that job satisfaction was negatively associated with intention to leave and turnover which that mean intention to leave and turnover was higher where satisfaction was lower or dissatisfaction. The reviews examining the extensive empirical literature are delineated as follows:

Davidson, Folcarelli, Crawford, Duprat, and Clifford (1997) studied the effects of health care reforms on job satisfaction and voluntary turnover among hospital-based nurses. Data were collected in a longitudinal survey of 736 hospital nurses in one hospital to examine correlates of change in aspects of job satisfaction and predictors of leaving among nurses who terminated in that period. Results showed that nurses who express the intention to leave at the baseline were in fact significantly more likely to leave by the time of follow up and intention to leave was related to job dissatisfaction.

Moreover, Lake (1998) studied the factors predicting nurse turnover in the U.S. Longitudinal analysis of precise job duration is used to evaluate the links between determinants, intention to stay with or leave the job, and resignation. The study found that job satisfaction was a significant predictor of intentions to leave ($p < 0.01$). Larrabee et al. (2003) studied the predictive ability between registered nurse job satisfaction and intent to leave. A predictive design evaluated these relationships. Results presented that the major predictor of intent to leave was job dissatisfaction.

Additionally, Hinshaw, Smeltzer, and Atwood (1987) used a nonexperimental and causal modeling design to test factors influencing actual turnover. Finding presented that actual turnover was weakly predicted by anticipated turnover. Anticipated turnover was moderately predicted by organizational and professional/occupational job dissatisfaction, lack of group cohesion and initial expectation of tenure. Lucas, Atwood, and Hagaman (1993) used the QHOM to test the theoretical model predicting job satisfaction, anticipated turnover, and actual turnover and found that anticipated turnover was predicted by organizational and professional job dissatisfaction, lack of group cohesion and age. Actual turnover was predicted by anticipated turnover and experience.

Irvine and Evans (1995) investigated the causal relationships among job satisfaction, behavioral intentions, and nurse turnover behavior. The results of the meta-analysis of studies published prior to 1993 pointed out that a strong positive relationship was indicated between behavioral intentions and turnover; a strong negative relationship between job satisfaction and behavioral intentions; and a small negative relationship between job satisfaction and turnover. Shader, Broome, Broome, West, and Nash (2001) investigated factors influencing satisfaction and anticipated turnover of nurses in an academic medical center. Results showed that the higher the job satisfaction, the lower the anticipated turnover ($p< 0.001$). Job satisfaction was the predictor of the anticipated turnover rate ($p<0.001$).

Similarly, studies in Thailand demonstrated that nurses' job satisfaction was associated with nurse turnover and retention. Sangpow (1999) addressed that job satisfaction influences turnover intention of professional nurses. A meta-analysis of 88 nurses' job satisfaction studies in Thailand during 1976-2003 suggested that

consequence of nurse job satisfaction were positively correlated with commitment/citizenship behavior (r = .408), retention (r = .383), and performance (r = .350); and negatively correlated with turnover (r = -.311), burnout (r = -.250), and intention to further study (r = -.063), p < .05 (Chumchuen, 2004).

Measurement of Job Satisfaction

Job satisfaction is considered within empirical studies either as overall or global feelings about the job, or as a related set of attitudes about various aspects of the job or facet approach (Spector, 1997). Facet approaches can determine which particular aspects of job are producing satisfaction or dissatisfaction for the individual and are, therefore, important in determining areas for improvement. There are many instruments for measuring facets of job satisfaction. The common instruments used in research are the Job in General Scale (JIG) (Thierry, 1998), the Andrew and Withey Job Satisfaction Questionnaire (Rentsch & Steel, 1992), the Job Satisfaction Survey (JSS) (Spector, 1985), the McCloskey Mueller Satisfaction Scale (MMSS) (Mueller & McCloskey, 1990), the Measure of Job Satisfaction (MJS) (Traynor & Wade, 1993), and the Nurse Satisfaction Scale (NSS) (Ng, 1993). Facets of job satisfaction can involve any aspect of the job and those frequently assessed include pay, co-worker, supervisor, organizational factors and work environment (Smith, Kendall, & Hulin, 1969; Stamps & Piedmonte, 1986). Most instruments are self-report questionnaires that ask nurses' perception of work related factors.

Another approach measuring job satisfaction is the global approach. The global approach is used when the interest is in overall attitude to the job. The single-item indicator is one method used to obtain the nurse's perception of particular

dimension of job satisfaction concept. This measure is congruent with nursing's emphasis on holism and individualism. Young and Casper (1993) suggested that a global single-item indicator requires that subjects consider all aspects of a phenomenon, ignore aspects that are not relevant to their situations, and differentially weigh the other aspects according to their values and ideals in order to provide a single rating. A global single item indicator is a valid measure of the concept of interest whenever researchers are interested in individuals' perceptions of a particular situation and in order to predict their behavior. Moreover, reliability and validity estimates of single-item measures show a consistent pattern across studies regardless of the response format used. The conclusion about single-item reliability was based on a meta-analysis (17 samples, 28 correlations, 7,682 persons) of the accumulated research using single-item measures of job satisfaction. It was concluded that a minimum reliability estimate of .70 for single-item measures of overall job satisfaction was reasonable (Wanous, Reichers, & Hudy, 1997).

The single item measure of job satisfaction was used to illustrate job satisfaction and job dissatisfaction in many studies (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Bogaert, Clarke, Vermeyen, Meulemans,& Heyning, 2009a; Bruyneel, Heede, Diya, Aiken, & Sermeus, 2009; Flynn, 2007; Friese, 2005; Gunnarsdottir, Clarke, Rafferty, & Nutbeam, 2009; Kanai-Pak, Aiken, Sloane, & Poghosyan, 2008; Kim, Capezuti, Boltz, & Fairchild, 2009; Laschinger et al., 2001; McCusker, Dendukuri, Cardinal, Katofsky, & Riccardi, 2004; Patrician, Shang, & Lake, 2010; Rafferty et al., 2007; Sochalski, 2004). Those studies illustrated that job dissatisfaction has happened in different countries, For instance, the study of Aiken et al. (2001) revealed nurses' job dissatisfaction from 43,000 nurses from more than 700

hospitals in the United States, Canada, England, Scotland, and Germany in 1998-1999. The findings demonstrated that the number of nurses working in hospitals who reported being dissatisfied with their job are 41 percent, 32.9 percent, 36.1 percent, 37.7 percent, and 17.4 percent in the U.S. (Pennsylvania), Canada, England, Scotland, and Germany, respectively.

Moreover, Rafferty et al. (2007) presented that 36.4 percent of nurses in English acute trusts reported being dissatisfied with current job. Gunnarsdottir et al., (2009) found that 17.9 percent of nurses at Landspitali University Hospital, Iceland assessed job satisfaction with present job as a little dissatisfied and very dissatisfied. The study of Bogaert et al. (2009b) investigated job dissatisfaction from 401 nurses in two high-technology hospitals from two different regions in Belgium and found that 8.5 percent were dissatisfied or very dissatisfied with the current job. Around 12.90 percent of nurses in Belgian hospitals reported that they were dissatisfied or very dissatisfied with the current job (Bogaert et al., 2009a). Approximately 60 percent of nurses in acute hospitals in Japan expressed dissatisfaction with their jobs (Kanai-Pak et al., 2008). Additionally, 27 percent of nurses in U.S. based Army Medical Department hospitals reported that they were dissatisfied with current job (Patrician et al., 2010).

Also, the single item measure of job satisfaction was associated with the nurse work environment and/or nurse staffing levels (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Bogaert et al., 2009a; Bruyneel et al., 2009; Flynn, 2007; Friese, 2005; Gunnarsdottir et al., 2007; Kanai-Pak et al., 2008; Laschinger et al., 2001; McCusker, Dendukuri, Cardinal, Katofsky, & Riccardi, 2005; Patrician et al., 2010; Rafferty et al., 2007; Sochalski, 2004).

In Thailand, almost all studies investigated job satisfaction from aspects of the job. Studies during 1995 to 2008 presented that overall aspects of nurses' job satisfaction were at moderate to high level (Detkasem, 2002; Kaewnak, 1998; Panuwatsuk, 2003; Sabmee, 1999; Sasomsap, 2004; Silaphan, 2005). Several studies examined the association between independent variables and job satisfaction of nurses. Those independent variables included nurse leadership (Banthet, 1999; Chimvong, 1996; Kaewnak, 1998; Nontapet, 1999; Poonchai, 1999; Seungjarernchai, 2002), organizational management (Detkasem, 2001; Kongthong, 1996; Kulkrissada, 1996; Luevanich, 1996; Panuwatsuk, 2003; Sasomsap, 2004; Satalalai, 2004; Sngawong, 2002; Srinuandee, 2003; Thayatham, 1994), and nursing care hours per patient day (Silaphan, 2005). However, there are difficulties stemming from problems in concluding or comparing studies and estimating trends because there are a variety of instruments used to measure job satisfaction of nurses. Most of them measure job satisfaction from facet approach which widely use measurement based on the IWS (Stamp & Piedmonte, 1986), the JSS (Spector, 1997), and Hackman and Oldham (1975).

In summary, job satisfaction of nurses in this study is defined as perceptions staff nurses have regarding their job as proposed in the 2007 Thai Nurse dataset (Aungsuroch & Wanant, 2007). Single item measure of job satisfaction was used because of the following reasons. Firstly, the nurses' work environment is one of independent variables anticipated positively to influence job satisfaction. The PES-NWI, an instrument measuring the nurses' work environment, includes five subscales that assess about nurse participation in hospital affairs, nursing foundations for quality of care; nurse manager ability, leadership and support of nurses; staffing and resource

adequacy; and collegial nurse-physician relations. If facet approaches of job satisfaction are applied, the PES-NWI subscales may overlap facets of job satisfaction; for example, pay/benefit and staffing and resource adequacy, interaction and collegial nurse-physician relations, supervision and nurse manager ability, leadership and support of nurses. To avoid overlap between independent and dependent variable, single item measure of job satisfaction is used in this study. Secondly, single item measure of job satisfaction has been widely used in many studies but has never been used to investigate the nurses' perspective in Thai hospitals. This research may reveal another aspect of job satisfaction of nurse in Thailand.

Burnout

Burnout is a common phenomenon in nursing and other health professions because they are often required to spend considerable time in intense involvement with other people. Nurse-client interaction is centered on the client's problem including psychological, social, or physical which are not always obvious and easily obtained. For the person who works continuously with people under such circumstances, the chronic stress can be emotionally draining and can lead to burnout (Maslach, et al., 1996). Therefore, burnout is a serious problem that is costly for both people and organizations and that every effort must be made to prevent it.

Definition of Burnout

The concept of burnout was first introduced in the mid-1970s in the United States as a description of adverse reactions to work in human services. It was first used to describe a syndrome of exhaustion observed among mental health professionals (Freudenberger, 1974). Since then, the concept of burnout has been defined in many ways. Perlman and Hartman (1982) defined burnout as a response to chronic emotional stress with three components: emotional and physical exhaustion, lowered job productivity, and over depersonalization. Pines and Aronson (1988) defined burnout as a state of physical, emotional, and mental exhaustion caused by long-term involvement in situations that are emotionally demanding. Burnout is also defined as a severe consequence of prolonged stress at work developed when the demands of work and the individual's capacity are in imbalance for a long period of time (Schaufeli & Enzmann, 1998).

The best-known definition of burnout presents this well-known psychological phenomenon as a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who work with people in some capacity (Maslach, et al., 1996). There are three subscales explaining burnout syndrome.

The first, emotional exhaustion subscale, is the key subscale of the syndrome and refers to feelings of being emotionally overextended and depleted of one's emotional resources. It is characterized by a lack of energy and a feeling that one's emotional resources are used up (Cordes & Dougherty, 1993). This compassion fatigue may coexist with feelings of frustration and tension as workers realize they

cannot continue to give of themselves or be as responsible for client as they had in the past (Cordes & Dougherty, 1993). A common symptom is dread at the prospect of returning to work the next day.

The second subscale, the depersonalization, adds an interpersonal subscale. It involves negative, cynical, overly detached and impersonal attitudes and feelings towards the recipients of one's services. Workers may display a detached and emotional callousness, and they may be cynical to coworkers, clients, and the organization (Cordes & Dougherty, 1993). Although a certain degree of psychological distance may be necessary and even beneficial when dealing with stressful and highly arousing situations, too much detachment may result in the individual developing negative attitudes towards his or her client/patients (Parker & Kulik, 1995). Visible symptoms include the use of derogatory or abstract language, strict compartmentalization of professional lives, intellectualization of the situation, withdrawal through longer breaks or extended conversations with coworkers, and an extensive use of jargon (Maslach & Pines, 1997). While the human service professional may still feel concern, they can no longer give of themselves as they had formerly (Maslach & Jackson, 1986).

The third subscale, reduced personal accomplishment, refers to a decline of feelings of competence and successful achievement in one's work, as well as a tendency to evaluate oneself negatively, particularly regarding one's work with other people. In other words, the individual experiences a decline in his or her feelings of job competence and successful achievement in their work or interactions with people (Cordes & Dougherty, 1993). Frequently there is the perception of a lack of progress or even lost ground. Feelings of diminished personal accomplishment may result from

factors suggesting one is unappreciated or that one's efforts are ineffective (Jackson, Turner, & Brief, 1987), or from factors that suggest one's competence or performance is low (Burke, Shearer, & Deszca, 1984).

In line with this conceptualization, Maslach and Jackson (1981a) devised their three-scale Maslach Burnout Inventory-Human Services Survey (MBI-HSS), which measures burnout among human service professionals.

The Consequence of Burnout

Studies of the consequences of burnout revealed that nurse burnout also appears to be a factor in job turnover and absenteeism (Maslach, et al., 1996). Lee and Ashforth (1996) conducted meta-analysis to examine how demand and resource correlates, and behavioral and attitudinal correlates were related to each of the three subscales of job burnout. Sixty one studies from 1982 to 1994 were used in the meta-analysis. This study concluded that the three burnout subscales were related to turnover intention, organizational commitment, and control coping. Similarly, Lake (1998) evaluated the links between determinants, intentions to stay with or leave the job, and resignation. The sample comprised all RNs in 40 nursing units in 20 community hospitals located in 11 high AIDS incidence cities (response rate = 86%, n= 680). An ordered logit model predicted intentions; a proportional hazards model predicted resignation. Survival curves indicated that the use of time frames to measure intentions effectively distinguishes strength of intent to leave. This study revealed a dominant effect of burnout, specifically emotional exhaustion in the prediction of nurse intention to resignation.

Recently, Fynn, Thomas-Howkins, and Clarke (2009) determined the association between burnout (emotional exhaustion) and nurses' intention to leave their jobs among nurses in U.S. chronic hemodialysis centers. Findings indicated that nurses experiencing burnout (emotional exhaustion) were more likely to be planning to leave their jobs. This study suggested that nurses who were burnout were 3 times as likely, compared to nurses who were not burnout, to be planning to stay with their employer but leave their current position, OR=3.0 (1.7, 5.0), p=.00, and to be planning to leave their employer, OR=2.70 (1.59, 5.86), p = .00.

Moreover, burnout of nurses can lead to deterioration in patient satisfaction (Maslach, et al., 1996). For instance, Gravlin (1994) measured burnout using MBI and found that depersonalization subscale was negatively related to patient satisfaction with nursing care, but emotional exhaustion and personal accomplishment subscales were not. Leiter, Harvie, and Frizzell (1998) found negative correlations between nurses' emotional exhaustion and patient satisfaction with 4 dimensions of hospital care (nurses, doctors, information, and outcome of care). Vahey et al. (2004) examined the association between nurse burnout and patient satisfaction. They conducted cross-sectional surveys of nurses and patients from 40 units in 20 urban hospitals across the United States. The results revealed that nurse burnout, as measured by emotional exhaustion and personal accomplishment subscales is a significant factor influencing patient satisfaction ($p<0.05$ and $p< 0.01$, respectively).

Measurements of Burnout

Many other questionnaires also have been developed to measure burnout in human service professionals, such as Burnout Measure (Pines & Aronson, 1988) and Staff Burnout Scale for Health Professionals (Jones, 1980). However, the above-mentioned questionnaires measure burnout as one-dimensional concept. By far the most widely used instrument to measure burnout is the MBI-HSS questionnaire, due, in part, to the well-established support for its reliability and validity (Maslach, et al., 1996).

The MBI-HSS has been shown to be the most valid and reliable multidimensional instrument for measuring burnout in human service work (Schaufeli & Van Dierendonck, 1993). The three-factor structure of the MBI-HSS, with emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) as distinct factors, has been confirmed in several studies (Evans & Fischer, 1993; Green, Walkey, & Taylor, 1991; Lee & Ashforth, 1990; Richardsen & Martinussen, 2004; Schaufeli & Van Dierendonck, 1993). There is also evidence of the three-factor structure of the Maslach Burnout Inventory-General Survey, which has been designed to measure burnout in occupational groups not involved in human services (Bakker, Demerouti, & Schaufeli, 2002; Leiter & Schaufeli, 1996; Schutte, Toppinen, Kalimo, & Schaufeli, 2000; Taris, Schreurs, & Schaufeli, 1999). The three subscales of the MBI have proved to remain invariant across occupational groups (Bakker et al., 2002; Green et al., 1991; Leiter & Schaufeli, 1996; Richardsen & Martinussen, 2004; Schuttle et al., 2000), as well as in samples from different

countries (Green et al., 1991; Hwang, Scherer, & Ainina, 2003; Schaufeli & Van Dierendonck, 1993; Schutte et al., 2000).

The developers of MBI stated that burnout is a multidimensional construct and it is expressed in three subscales. Additionally, they claim the EE subscale of the MBI alone is not enough to measure burnout since it only captures one subscale of burnout (Maslach, 2003). Emotional exhaustion is the basic stress response resulting from high workload, while PA and DP represent more complex subscales of burnout. DP is generally related to social conflict and relationships, and PA is related a lack of resources for performing their job, lack of necessary supplies, tools or information (Maslach & Jackson, 1981b). The overall conclusion is that all three subscales of burnout are related to many workplace factors and combining these subscales demonstrates different work experiences and risks for burnout (Maslach, 2003).

Several studies showed that the MBI-HSS was utilized to measure nurse burnout (Aiken et al., 2008; Aiken et al., 2001; Aiken, Clarke, Sloane, Sochaski, et al., 2002; Bogaert et al., 2009a; 2009b; Bruyneel et al., 2009; Friese, 2005; Fynn et al., 2009; Gunnarsdottir et al., 2009; Kanai-Pak et al., 2008; Laschinger et al., 2001; Leiter & Laschinger, 2006; Patrician et al., 2010; Poghosyan, Aiken, & Sloane, 2009; Rafferty et al., 2007; Sheward et al., 2005; Vahey et al, 2004). Among three burnout subscales, emotional exhaustion was widely investigated to display nurse burnout in many settings. The study of Aiken et al. (2001) investigated nurse burnout in various countries and they found that percents with scores in high emotional exhaustion range according to norms were 43.2 percent in U.S. hospitals, 36 percent in Canada, 36.2 percent in England, 29.1 percent in Scotland, and 15.2 percent in Germany. Friese (2005) presented that nurses in Oncology unit in ANCC hospitals had high scores of

emotional exhaustion around 20 percent. Aiken, Clarke, Sloane, Sochaski, et al. (2002) presented that 43.2 percent of nurses in hospitals in Pennsylvania had high emotional exhaustion. Sheward et al. (2005) presented that analysis of the individual nurses' data showed that 27 percent of Scottish nurses and 34 percent of English nurses had high scores of emotional exhaustion. Kanai-Pak et al. (2008) found that 56 percent of nurses in acute hospitals in Japan reported high emotional exhaustion. Patrician et al. (2010) revealed that 30 percent of nurses in the U.S. based Army Medical Department hospitals had high emotional exhaustion.

In Thailand, prior studies of nurse burnout during 1995-2008 revealed that the MBI-HSS was widely used to measure nurse burnout in Thailand. Results revealed that nurses scored high to low levels of emotional exhaustion, depersonalization, and personal accomplishment (Hasithawech, 2003; Jampankarm, 2003; Jarernsuk, 2001; Jariyapayuklert, 2007; Kachitakorn, 2001; Khwanmuang, 1998; Kitsumbun, 1995; Namakankham, 1999; Puaraksa, 1998; Raksasuk, 2001; Sirakamon, 1997; Theucksuban, 2007). Burnout in all subscales were significantly related to personal factors such as age, marital status, experience, survival & personal maintenance, sense of coherence, locus of control, professional competency, stress, sex, family responsibility, personal growth, hardiness, and mental health self-care (Chaichitamorn 1999; Hasithawech 2003; Jampankarm 2003; Jariyapayuklert 2007; Kachitakorn 2001; Khwanmuang, 1998; Puansurin 1998; Puaraksa 1998; Theucksuban 2007). They were significantly associated with job characteristics such as working time, work load, autonomy, quality of work, management, work structure, administration system, and work evaluation (Hasithawech, 2003; Jarernsuk, 2001; Kachitakorn, 2001; Khwanmuang, 1998; Puaraksa, 1998; Raksasuk, 2001).

Additionally, they were related to interrelationship (Hasithawech, 2003; Puaraksa, 1998), social support (Hasithawech, 2003; Puansurin, 1998; Puaraksa, 1998; Sirisak, 2007), physical environment (Hasithawech, 2003), conflict (Jampankarm, 2003), client demand and income (Hasithawech, 2003). Only emotional exhaustion and depersonalization were related to head nurses but personal accomplishment was related to perceived support from spouse, friends, and relatives (Chaichitamorn, 1999). Although nurse burnout was widely investigated in Thailand, the association of nurses' work environment and nurse staffing levels with three burnout subscales never had been investigated.

In summary, nurse burnout in this study is defined as a response to items that elicited the staff nurses' perception to their emotional exhaustion, depersonalization, and personal accomplishment subscales as proposed in the 2007 Thai Nurse dataset (Aungsuroch & Wanant, 2007). The MBI-HSS was used to measure nurse burnout in this study because it is capable of capturing all subscales of burnout and the most widely used instrument to measure burnout of nurses.

Quality of Nursing Care

The purpose of a health care system is to continually reduce the burden of illness, injury, and disability, and to improve the health and functioning of the people. Evaluations of health care quality provide concrete assessment of the degree to which the health care system is successfully achieving this purpose, and can be used to track whether quality improvement interventions are effective (McGlynn, 2007).

Definition and Consequence of Quality of Nursing Care

Quality is the ability of a product or service to satisfy stated or implied needs (American Society for Quality [ASQ], 2004) and the degree to which they meet customer or patient expectations (Hoy & Miskel, 2000). Schmele (1996) stated that from the literature it emerged that quality is used in the following ways: excellence, ideal, fitness for purpose and conformance to standards, meeting the customer's requirements, satisfying need, and customer value. Moreover, the Joint Commission described quality as the degree to which patient care services increase the probability of desired patient outcomes and reduce the probability of undesired outcomes, given the current state of knowledge (Joint Commission on Accreditation of Healthcare Organizations [JCAHO], 1991).

In nursing, the quality of nursing care is defined in many perspectives. According to patient perspective, patients perceived quality of nursing care as caring, and interpersonal interactions (Williams, 1998). Using a qualitative approach, Price (1993) provided the meaning of quality nursing care as patients' technical and non-technical needs being met. The technical needs emphasized the nurse carrying out technical functions using machines or equipment such as intravenous lines, masks, and thermometers. Non-technical needs described by patients include the need for information, diversion, socialization, sleep, and decreasing stress. Similarly, Larrabee and Bolden (2001) identified quality of nursing care from patients as providing for my needs, treating me pleasantly, caring about me, being competent, and providing prompt care.

Based on a nurse perspective, nurses perceive quality of nursing as relating to the degree to which patient's physical, psychosocial, and extra care needs were met (Williams, 1998). Similarly, Kunaviktikul et al. (2001) identified the quality of nursing care in Thailand as the practice of nursing which responses to physical, psychological, emotional, social, and spiritual needs of clients in a caring manner, so that the clients are cured, healthy, and live normal lives; and both clients and nurse are satisfied. More recent, Tafreshi, Pazargadi, and Saeedi (2007) defined quality of nursing care in Iran as the delivery of safety care based on nursing standards which eventuates patient satisfaction.

The consequences of quality nursing care identified in the preceding literature analysis were categorized as including health/wellness level, functional ability, patient satisfaction, resource utilization/cost effectiveness/efficiency, undesirable events, and undesirable processes (Schmele, 1996).

Measurement of Quality of Nursing Care

Nurse quality indicators, the most widely used measure of quality of nursing care, are instruments or standards to measure the achievement of quality of nursing care. The domains of quality of care described by Donadedian (1980) incorporate many of these aspects. The first domain is 'technical care', the application of professional knowledge through the use of skills interventions intended to promote a patient's health. The second is 'interpersonal relationships' between patients and health professionals and the contextual aspects of care (Lynn & Moore, 1997). Both aspects are important in assessing care quality. Several indicators are evaluated in Donabedian's framework (structure-process-outcome) (Brook et al., 1977; Brook

et al., 1979; Donadedian, 1980; Lohr et al., 1986) in which structure is concerned with the health care setting, process is what happens or how the care is delivered, and outcome refers to the result of services. The American Nurse Association (ANA) based on Donabedian's quality model proposed 10 nursing-sensitive quality indicators: structure includes staff mix, nursing care hours provided per patient day; process includes maintenance of skin integrity and nurse staff satisfaction; outcome includes nosocomial infection, patient injury rate, patient satisfaction, patient satisfaction with pain management; patient satisfaction with educational information; patient satisfaction with overall care (ANA, 1997; 1999).

Shindule-Rothschild, Long-Middleton, and Berry (1997) examined the factors that could predict the quality of care as perceived by RNs. This study showed that 10 factors were most predictive of how nurse perceive quality of patient care in the hospitals in which they worked. Those factors were categorized into the three areas of structure - reduction in RNs, loss of RN executives without replacement; process - time to provide basic nursing care and ability to uphold professional standards; and outcomes - patient and family complaints, pressure ulcers/skin breakdown, injuries to patients, and medication errors.

In Thailand, studies for quality nursing care indicators have been identified. Kunaviktikul et al. (2001, 2005) provided definitions and nursing quality indicators in Thai nursing based on Donabedian's quality model. Those indicators included nosocomial UTIs; falls; skin integrity; satisfaction with health education information; satisfaction with pain management; satisfaction with general nursing care; nursing staff satisfaction; nursing staffing; and nursing hours. Likewise, Tapaneeyakorn (2002) indicated the quality indicators of nursing care according to the perception of

nurse administrators. This study found five important indicators including medication error rate, total nosocomial infection rate, nosocomial surgical wound infection rate, accurate and timely execution of therapeutic intervention and procedure, and adverse incident rate. Additionally, Bureau of Nursing, Department of Medical Science, Ministry of Public Health, Thailand (2004) addressed nursing quality indicators and those indicators consist of staff mix, nursing hours per patient day, nursing personnel's job satisfaction, nosocomial pressure ulcer rate, nosocomial infection rate, effectiveness of nosocomial infection surveillance, catheter associated UTI rate, unplanned readmission in 28 days, patient satisfaction, and patient length of stay.

Measurement of quality of nursing care is not only assessed from aspects of quality of nursing care, but also a single-item indicator is another method used to obtain the nurse's perception of specific dimensions of quality of nursing care. Nurse ratings of quality of nursing care aggregated to the hospital level provide related yet distinct information about patient outcomes when compared with statistics derived from administrative databases (Aiken, Clarke, & Sloane, 2002). Single item questionnaires for assessment of overall quality have been used in a number of studies assessing the quality of medical and nursing care and have been found to be strongly associated with patient outcomes (Ayanian, Weissman, Chasan-Taber, & Epstein, 1998; Brook, McGlynn & Cleary, 1996; Pearson, et al., 2000; Reschovsky, Reed, Blumenthal, & Landon, 2001). For instance, Sochalski (2001) explored the variation in nurse reports of the quality of nursing care at their hospital and investigated what factors were associated with those assessments. This study suggested that nurses with low ratings on quality of care also report higher numbers of nursing care tasks left undone at the end of the last shift they worked compared with those who rate the

quality of care as good or excellent. Also, quality scores were associated with adverse patient events occurring in hospitals such as medication errors, nosocomial infections, and patient falls with injuries among patients.

Asking several nurses for overall quality of nursing care is implicit peer review. The availability of reliable, valid implicit peer review tools could enhance effective monitoring of the many recent changes in nursing and hospital organization (Wunderlich, Sloan, & Davis, 1996) and could become part of routine quality review across, as well as within, health care settings. This method reflects expert peer judgment and as such has intrinsic validity. It is a flexible method that is easily comprehended and that can take into account the unique aspects of any particular case. Moreover, because it relies on expert judgment rather than present standards, it automatically reflects advances in practice and technology as they become known to the professional community. Reliance on expert peers also keeps the profession in charge of performance monitoring and regulation. The study of Pearson et al. (2000) addressed that this method has adequate inter-rater and excellent scale reliability ($p < 0.001$).

A single item assessment of quality of care was used to assess quality of nursing care in the International Hospital Outcomes Studies (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Bogaert et al., 2009a, 2009b; Bruyneel et al., 2009; Friese, 2005; Fynn, 2007; Gunnarsdottir et al., 2009; Kanai-Pak et al., 2008; Kim et al., 2009; McCurker, Dendukuri, Cardinal, Laplante, & Bambonye, 2004; Patrician et al., 2010; Rafferty et al., 2001; Rafferty, et al., 2007; Sochalski, 2004). It also was used to measure quality of nursing care from nurses in many settings. For instance, reporting the quality of care is fair or poor was 21.9 percent for nurses in high-technology

hospitals in Belgium (Bogaert et al., 2009b), 20.3 percent for nurses in acute care hospitals in Pennsylvania (Sochalski, 2004), 16.0 percent for nurses in English acute trusts (Rafferty et al., 2007), 4.9 percent for nurses in University hospital, Reykjavik, Iceland (Gunnarsdottir et al., 2009), 29.03 percent for nurses in Belgian hospitals (Bogaert et al., 2009b), 59 percent for nurses in Japan (Kanai-Pak et al., 2008), 16 percent for nurses in U.S. based Army Medical Department hospitals (Patrician et al., 2010), and 37.3 percent for nurses in university-affiliated hospital in Quebac, Canada (McCurker et al., 2004).

Additionally, a single item assessment of quality of nursing care has been studied to associated with nurses' work environment and nurse staffing levels (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Bogaert et al., 2009 a, 2009b; Bruyneel et al., 2009; Friese, 2005; Fynn, 2007; Gunnarsdottir et al., 2009; Kanai-Pak et al., 2008; Kim et al., 2009; Laschinger et al., 2001; McCurker et al., 2004; Patrician et al., 2010; Rafferty et al., 2007; Sochalski, 2004).

In Thailand, almost all studies of quality of nursing care are assessments of nursing care quality from patients, and both patient and nurse perspective. The average nursing care quality perceived by patients was moderate level to high level (Chalortham, 2001; Juntun, 2007; Kobpungton, 1997; Luangfong, 2006; Nampoonsak, 2005; Promchan, 2006; Soisangwon, 2007; Suvinaitragool, 1999). The average of nursing care quality perceived from nurse and patient were also moderate level to high level (Kiettisanpipop, 1990; Nampoonsak, 2005; Promcharoen, 2006). Interestingly, the studies about factors related to quality of nursing care are rarely studied in the Thai research arena.

In summary, since nurses comprise the largest group of health care providers and are legally liable and morally responsible for the quality of care they provide to patients, their perspectives on quality of nursing care are important. Therefore, the quality of nursing care in this study is defined as nurses' perception of quality of nursing care delivered to patient as proposed in the 2007 Thai Nurse dataset (Aungsuroch & Wanant, 2007). A single item for over all assessment of quality is used to measure quality of nursing care because this measure has been widely used and associated with nurse work environment and nurse staffing levels. Moreover, this measure has never been used to investigate nurses' perspectives in Thai public hospitals before. Therefore, this study may reveal another aspect of quality of nursing care from perspective of nurses.

System

System is a regularly interacting or interdependent group of items forming a unified whole (Merriam-Webster Online Dictionary, 2010). In healthcare field, system also defined as material resources, human resources, organizational characteristics (Donabedian, 2005). Additionally, system is defined as characteristics of the organization where care is provided or the provider itself (Mitchell, et al., 1998). The system is conceptually to include the nurses' work environment and nurse staffing levels. The literature relevant to the nurses' work environment and nurse staffing levels are presented below.

The Nurses' Work Environment

Nurses' work environment has become the significant factor of heath care crisis including nursing shortage and patient safety. Improving nurses' work environment is essential for addressing the shortage and as mechanism for improving patient outcome.

Definition of Nurses' Work Environment

Work environment refers to the perceptions of workers regarding elements of the organization that relate to activities on the job (Tregunno, 2004). The work environment is also considered to be a set of concrete or abstract psychological features, such as job characteristics, autonomy, and promotion opportunities perceived by job incumbents who compare their perceptions against a set of standards, values, or needs (Weiss & Cropanzano, 1996). Similarly, it is defined as the set of summary or global perceptions individuals have about their organization or organizational subunit (Tumulty, Jernigen, & Kohut, 1994). The work environment has long been recognized as a source of influence on individual behavior and can be perceived as the personality of a setting or organization (Moos & Insel, 1994).

In nursing, the importance of the work environment was delineated in a landmark magnet hospital study (McClure et al., 1983). In the early 1980s, there was a nursing shortage situation in the U.S. At that time, many hospitals seemed to have problems attracting and retaining nursing staff. However 41 hospitals had the opposite experience so they were called magnet hospitals. Magnet hospitals were defined as hospitals where they can recruit and retain nurses. The work environments in those

hospitals were characterized as having adequate staffing levels; flexible scheduling; strong, supportive, and visible nurse leadership; recognition for excellence in practice; participative management with open communication; good relationships with physician; salaried rather than hourly compensation for nurses, professional development; and career advancement opportunities (Sovie, 1984). Comparing with low nurse turnover rates, the organizational characteristics that accounted for nurse satisfaction and retention were determined by the American Academy of Nursing (AAN).

Aiken and Patrician (2000) then identified those traits of hospitals that are essential to excellent patient outcomes and the retention of a qualified nurse workforce. Magnet hospitals were used as the sample. The conceptual framework that guided their work has origins in the sociology of organizations and professions. They showed that organizational attributes in health care settings that support clinical practice such as decentralization of authority, managerial support, interdisciplinary collaboration, continuity of care, effective communication channels, and adequate resources are essential to the ability of clinician, such as nurses, to identify and respond to fluctuating patient conditions. Thus, by supporting clinical surveillance and response, these organizational attributes contribute to high-quality patient care. Theorists further proposed that health care organizations that exhibit these supportive attributes will experience higher rates of positive patient outcomes, fewer adverse patient events, and higher levels of job satisfaction and retention among clinical staff (Flood & Scott, 1987; Freidson, 1970; Peters & McKeon, 1998; Shortell & Kaluzny, 1988; Strauss, 1975).

In 2002, Lake defined the nursing practice environment as the organizational characteristics of a work setting that facilitate or constrain professional nursing practice. The definition was conceptualized from the sociology of organizations, occupations, and work and professional models. Lake (2002) derived an empirical set of subscales through factor analysis of a sample from the original magnet hospitals and a sample of Pennsylvania hospitals. These organizational characteristics are hospital supporting nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership and support of nurses, staffing and resource adequacy, and collegial nurse-physician relations.

The American Association of Colleges of Nursing (2002) presented hallmarks of the Professional Practice Environment which were characteristics of the practice setting that best support professional nursing practice and allow nurses to practice to their full potential. The hallmarks are: (1) manifest a philosophy of clinical care emphasizing quality, safety, interdisciplinary collaboration, continuity of care, and professional accountability; (2) recognize contributions of nurses' knowledge and expertise to clinical care quality and outcomes; (3) promote executive-level nursing leadership; (4) empower nurses' participation in clinical and organizational decisions; (5) maintain clinical advancement programs based on education, certification, and advanced preparation; (6) support nurses' professional development; (7) create collaborative relationships within the health care provider team; and (8) use technological advances in clinical care and information systems.

Recently, the International Councils of Nurses (ICN, 2007) presented positive environment. These environments were launched to support excellence and have the power to attract and keep nurses in organization. Positive practice

environments are characterized by innovative policy frameworks focused on recruitment and retention, strategies for continuing education and upgrading, adequate employee compensation, recognition programs, sufficient equipment and supplies, and a safe working environment.

Based upon previous studies, there is no consistency defining the nurses' work environment. Different authors frequently use a variety of terms identifying work environment such as nursing practice environment, magnet hospital characteristics, positive work environment, and professional practice environment. Those kinds of nurses' work environment are assumed as organizational aspects fostering environments that support the working of nurses to meet desired outcomes. The common attributes of nurses' work environment are supporting organizational management, nurse leadership, quality of nursing care, nurse staffing and resource, and nurse-physician relationship. The nurses' work environment was firstly explored to better understand that it influences nurses' job satisfaction and turnover (Hinshaw & Atwood, 1984). Then the attention shifted to explaining quality of care and patient outcomes (Mark, Salyer, & Wan, 2003; Mitchell & Shortell, 1997). Recently, the significance of the nurses' work environment has focused on patient safety (Institute of Medicine, 2003). Therefore, the nurses' work environment could be conceptualized to emphasize job satisfaction of nurses, quality of care, or patient safety (Lake, 2007).

Measurement of Nurses' Work Environment

There are many tools to measure nurses' work environment. For instance, the Work Environment Scale (WES) (Moos & Insel, 1994), The Job Characteristics Inventory (JCI) (Sims, Szilagyi, & Keller, 1976), The Ward Organization features

Scales (WOFS) (Adams, Bond, & Arber, 1995), The Work Quality Index (WQI) (Whitley & Putzier, 1994), The Assessment of Work Environment Schedule (AWES) (Nolan, Grant, Brown, & Nolan, 1998), the Revised Nurse Work Index (NWI-R) (Aiken & Patrician, 2000), the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake, 2002). Literature review suggested that most of tools are self-report questionnaires that are obtained through the written response of the subject, which could determine facts, attitudes, or opinion of subjects or person.

Among mentioned tools, the NWI-R and the PES-NWI have been widely used to describe and compare nurses' work environment in different settings (Lake, 2007). The NWI-R and PES-NWI also have been used to assess the effects of the nurses' work environment on nurse and patient outcomes (Aiken, Clarke, & Sloane, 2002; Aiken & Sloane, 1997; Clarke et al., 2002; Friese, 2005; Laschinger et al., 2003; Laschinger et al., 2001; Leiter & Laschinger, 2006; Manojlovich, 2005; O'Brien-Pallas et al., 2004; Shamian, Kerr, Laschinger, & Thomson, 2002; Thomas-Hawkins, Denno, Currier, & Wick, 2003; Vahey et al., 2004). However, comparing in terms of content, length, and performance, the PES-NWI is the most useful instrument at present. It is equivalent or superior to other existing instruments (Lake, 2007). The details of PES-NWI are presented as follows:

The Practice Environment Scale of Nurse Work Index (PES-NWI). The PES-NWI has derived from the Nursing Work Index (NWI), the survey scales most frequently used to measure magnet characteristics. The NWI was designed to inclusively and comprehensively reflect the findings of the 1983 magnet research study (Kramer & Schmalenberg, 2008). It was intended to measure four variables: work values related to job satisfaction of staff nurses, work values related to perceived

productivity, job satisfaction of staff nurses, and perceived productivity (the perception of an environment conductive to quality nursing care). Content validity for the instrument was assured by having three of the four original magnet researchers review it for inclusiveness (Kramer & Hafner, 1989).

Then, Aiken and Patrician (2000) subsequently adapted the NWI to measure only organizational features by dropping the judgment statements related to job satisfaction and perceived productivity. Compared to the NWI, the NWI-R contained fewer items, but otherwise remained the same except that one item was modified and two more were added. Four NWI-R subscales including nurse autonomy, nurse-physician relationships, organizational support, and control over nursing practice were conceptually derived from an item subset.

After that, Lake (2002) developed the PES-NWI for measuring nurse practice environment that will facilitate professional nursing practice, enhance the quality of patient care, and improve outcomes for both nurses and patients. Lake conceptualized the nurse practice environment from the sociology of organizations, occupations, and work and professional models. An empirical set of the PES-NWI subscales was derived through factor analysis from NWI. The scale development and evaluation proceeded in five stages, the first involving the NWI item set, the second through fourth stages involving 1986 NWI data from staff nurses in a sample of the original magnet hospital (Kramer & Hafner, 1989).The last stage involving 1998 NWI-R data from staff nurses working in Pennsylvania hospitals (Aiken et al., 2001). The PES-NWI is operationalized by an aggregate score of the psychometrically derived subscales of the NWI-R (Aiken & Patrician, 2000; Lake, 2002). Finally, 31 items (silent loading ≥ 0.40) revealed from exploratory factor analysis produce a five-

subscale structure including nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership, and support for nurses, staffing and resource adequacy, and collegial nurse-physician relations.

The first subscale revealed the participatory role and valued status of nurses in a broad hospital context. Nurse were involved in hospital and nursing department affairs (internal governance, policy decisions, and committees), had opportunities for advancement, communicated openly with a responsive nursing administration, and acknowledged a powerful, visible and accessible nurse executive.

The second subscale emphasized the nursing foundations for a high standard of patient care: a pervasive nursing philosophy, a nursing (rather then a medical) model of care, and nurses' clinical competence. Quality was assured by a formal quality assurance program, as well as by cultivation of new staff and continuing education for all staff. Several indicators of a nursing model of care completed this subscale: continuity of nursing care and the use of nursing diagnosed and nursing care plans.

The third subscale focused on the critical role of the nurse manager. The dominant characteristic described key qualities of a nurse manager: being a good manager and leader. The remaining items illustrated ways the nurse manager supported the nurse: when there was a conflict with a physician, when nurses made mistakes, and by praising and recognizing a job well done.

The forth subscale described having adequate staff and support resources to provide quality patient care. The items with the highest salience (i.e., factor loadings) referred to having enough nurses. Two keys to providing quality patient care were

being able to spend time with patient and being able to discuss patient care problems with other nurses.

The fifth and smallest subscale was characterized by the positive working relationships between nurses and physicians. This subscale was named to recognize nurses' desire for collegial relationships with physicians.

After releasing, the PES-NWI has been widely used to measure nurses' work environments in various settings. The PES-NWI is the only instrument with magnet hospital reference scores available for both original and American Nurses Credentialing Center (ANCC) magnet hospital (Lake, 2002; Lake & Friese, 2006). The PES-NWI factor structure was confirmed with 1998 data from 8,597 nurses from Ontario and Alberta (Leiter & Laschinger, 2006), 1999 data from staff nurses throughout Pennsylvania (Lake, 2002), with 2001 data from 243 nurses in a Quebec hospital (McCusker et al., 2004), and with 2004 data from 2,900 nurses in 14 hospitals in Texas (Peterson, Krebs, & Erspamer, 2004 as cited in Lake, 2007). Interestingly, the PES-NWI was selected by the National Quality Forum (NQF) as a Nursing Care Performance Healthcare Organizations developed specifications for the implementation of the NQF measures (JCAHO, 2005). In 2006, the National Database of Nursing Quality Indicators began to offer the option of the PES-NWI as part of the annual nurse survey (U.S. National Database of Nursing Quality Indicators, 2006).

Several studies have used the PES-NWI revealing the characteristics of nurses' work environment. For instance, the mean of nurse participation subscale, nursing foundation subscale, nurse manager ability subscale, staffing and resource adequacy subscale, and collegial nurse-physician subscale were 2.60, 3.03, 2.63, 2.31, and 3.07 respectively in non- ANCC hospitals, 2.90, 3.26, 2.86, 2.88, and 3.09 in

ANCC hospitals (Friese, 2005), 2.43, 2.69, 2.49, 2.03, and 2.79 respectively in university-affiliated hospital in Quebec, Canada (McCusker et al., 2004), 2.52, 2.85, 2.57, 2.61, and 2.99 respectively in U.S. based Army Medical Department (AMEDD) hospitals (Patrician et al., 2010), and 2.38 , 2.71 , 2.46 , 2.32 , and 2.82 in acute care hospitals in Canada (Laschinger & Leiter, 2006). Additionally, Aiken et al. (2008) presented the mean score of nursing foundation subscale, nurse manager ability subscale, and collegial nurse/physician relations subscale in hospitals in Pennsylvania were 2.2, 2.4, and 2.8 respectively.

Effects of Nurses' Work Environment on Nurse and Patient Outcomes

Nurse' work environment is widely recognized as important factor contributing to nurse and patient outcomes. This can be explained that when nurses work in environments that support professional practice such as supporting nurses to participate in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership and support of nurses, adequate staffing and resources, collegial nurse-physician relations, they are likely to feel the strong focus on high-quality patient care, creates expectations and support for prompt identification and reporting of errors. It follows that nurses working in an environment that provides them the power and resources to perform their job optimally and is supportive of professional nursing practice will also experience a positive safety climate in their working setting. Consequently, they feel that they are respected and valued members of the patient care team. They feel more capable of monitoring for and responding to threats to patient safety.

The literatures related to these concepts were reviewed to establish an empirical foundation on how the nurses' work environments have the potential to affect job satisfaction of nurse, nurse burnout, and quality of nursing care. The following research reviews focus on the connection among those variables.

Laschinger, Shamian, and Thomson (2001) investigated the relationships of nursing workplace conditions to organizational trust, burnout (emotional exhaustion) and job satisfaction, and nurse-assessed patient care quality. The sample used for this analysis consisted of 3,016 staff nurses from 135 hospitals in Canada. Findings suggested that nurses' work environment affected job satisfaction of nurses indirectly in two ways: First, through emotional exhaustion, and second through trust in management. Higher levels of nurses' work environment were associated with higher levels of trust in management (β=.56) which was in turn associated with higher job satisfaction (β =.17). Second, positive work environment characteristics were associated with lower burnout levels (β=-.62) which in turn were associated with higher job satisfaction (β=-.55). Moreover, findings implied that higher levels of nurses' work environment were associated with higher levels of trust in management (r = .56) which was associated with higher perceptions of patient care quality (r = .34). Positive work environment characteristics were associated with lower burnout levels (r = -.62) which in turn were associated with higher perceived quality (r = -.42).

Similarly, Leiter and Laschinger (2006) tested a nursing worklife model that defined structured relationships among professional practice environment qualities and burnout. Hospital-based nurses in Canada (N=8,597) completed an assessment. Results revealed that a causal model confirmed the factor structure of the PES-NWI on a subset of NWI items and the factor structure of the MBI-HSS. The

analysis provided support for a structural model linking the five factors used to define a fundamental role for nursing leadership in determining the quality of worklife regarding policy involvement, staffing levels, support for a nursing model of care, and physician-nurse relationship.

Aiken, Clarke, and Sloane (2002) examined the effects of nurse staffing and organizational support for nursing care on nurses' dissatisfaction with their jobs, nurse burnout (emotional exhaustion), and nurse reports of quality of patient care in an international sample of hospitals. Multisite cross-sectional survey was undertaken in 10,319 nurses working on medical and surgical units in 303 hospitals in the United States (Pennsylvania), Canada (Ontario and British Columbia), England, and Scotland. Results suggested that an effect of hospital organizational support for nursing care on both nurse-specific outcomes of evident, both before and after nurse staffing is controlled. Nurses working in hospitals with weak organizational support for nursing care were twice as likely to report dissatisfaction with their jobs (OR = 2.02, 1.75-2.34), burnout scores above published norms for medical personnel (OR = 2.03, 1.76-2.34), and the quality of care on their units as fair or poor (OR = 2.44, 2.05-2.91), $p<0.001$.

In addition, Vahey et al. (2004) studied the effects of the work environment on nurse burnout and the effects of work environment and nurse burnout on patients' satisfaction with their nursing care. The cross-sectional surveys of 820 nurses and 621 patients from 40 units in 20 urban hospitals across the United States were conducted. After controlling of nurse characteristics, all of the nurse outcomes including emotional exhaustion and depersonalization except for feeling of personal accomplishment are significantly affected by the nurse work environment. This means

that the likelihoods of having higher score than average emotional exhaustion and higher score than average depersonalization are lower in units with good environments than in units with mixed environments, and lower in units with mixed environments than in units with poor environments, by factors of 0.59, and 0.68, respectively.

Manojlovich (2005) investigated direct and indirect relationships among the practice environments, nurse-physician (RN-MD) communication, and job satisfaction. Survey were sent to a random sample of 500 hospital nurses throughout Michigan, and 332 (66 percent) responded. Results presented that both supporting nurses' work environment and RN-MD communication explained 61% of the variance in nurses' job satisfaction scores. Flynn (2007) explored associations between organizational support for nursing practice in home health care agencies and (a) the frequency of nurse-reported adverse events, (b) nurse-assessed quality of care, (c) job satisfaction of nurses, and (d) nurses' intention to leave their employing agency. Data were collected from a sample of 137 registered nurses employed as home health nurses in the United States. The findings showed that the organizational support for nursing, as an indicator of a supportive work environment, was positively correlated to job satisfaction ($r = .31$, $p < 0.001$) and nurse-assessed quality of care ($r = .49$, $p < .0.001$).

Furthermore, Aiken et al. (2008) analyzed the net effects of nurse practice environments on outcomes including job satisfaction of nurses, burnout (emotional exhaustion), intent to leave, and reports of quality of care, as well as mortality and failure to rescue in patients after accounting for nurse staffing and education. Data from 10,184 nurses and 232,342 surgical patients in 168 Pennsylvania hospitals were

analyzed. Findings revealed that in fully adjusted models (where care environment and staffing are entered together and controlling for nurse and hospital characteristics) the odds of nurses being dissatisfied with their job, being high emotional exhaustion, and assessing quality of nursing care as poor or fair was lower by 25 percent, 24 percent, and 38 percent in hospitals in the mixed category relative to the poor category and in the better category relative to the mixed one.

Fynn, et al. (2009) investigated the effects of workload, practice environment, and care processes on burnout (emotional exhaustion) among nurses in U.S. chronic hemodialysis centers. Findings indicated that when estimating the adjusted effects, controlling for the effects of other predictor variables, respondents who rated their practice environments as least supportive were more than 4 times as likely to be burned out compared to RNs who rated their practice environment as most supportive (OR=4.60, 1.96-10.78), $p<.01$.

Moreover, Bogaert et al. (2009b) investigated relationships between nurse practice environment, burnout, job outcomes and nurse-nurse-assessed quality of care. Survey data from 401 staff nurses across 31 units in two hospitals were used to test this model using structural equation modeling techniques. Results revealed that goodness of fit statistics confirmed an improved model with burnout subscales in mediating positions between nurse practice environment dimensions and both job outcomes and nurse-assessed quality of care, explaining 20 percent and 46 percent of variation in these two indicators, respectively.

Recently, Patrician, et al. (2010) investigated the contributions of nurse staffing and the practice environment in predicting RN work outcomes and RN rated quality of care. This study conducted in Army nurses and Army civilian RN staff

nurses who worked in inpatient units within the Army's 23 U.S. hospitals in 2002 and 2003. The results revealed that the results of multivariate logistic regression analyses for all variables in the analyses. For each outcome, the strongest consistent predictor of negative RN work outcomes was an unfavorable practice environment. Compared with nurses who reported favorable work environment, nurses who reported unfavorable work environments were nearly 14 times more likely to experience job dissatisfaction, 13 times more likely to experience emotional exhaustion, and 11 times more likely to report fair to poor care quality, controlling for all other independent variables in the model.

In Thailand, two studies demonstrated that work environment is related to nurse burnout. Suriyotee Na Rascharima (1994) studied the influence of personal characteristics, work environment and social support on nurse burnout in regional/general hospitals under the jurisdiction of the Ministry of Public Health. Results revealed that total work environment was significantly related to burnout ($p<.0001$). Raksasuk (2001) studied the relation between work environment and burnout of professional nurses in community hospitals in region 3. The results showed that work related factors such as workload was a factor that significantly predicted burnout among professional nurses ($r=.332$, $p=.01$).

Additionally, a study presented that nurses' work environment is related to satisfaction of nurses. Sanpornchaipong (2002) studied relationships between personal factors, work environment, and work satisfaction of staff nurses in in-patient departments, community hospitals, in the central region. The results presented that overall work environment was significantly related to work satisfaction of staff nurses ($r = .732$, $p < .01$).

Considering in terms of nurse' work environment subscales, previously various studies investigated the relationship between nurse' work environment subscales and job satisfaction of nurses, nurse burnout, and quality of nursing care. Those studies are delineated as follows:

Nurse participation in hospital affair subscale: this subscale related to the degree to which nurses perceive being valued within the hospital context. Nurses in favorable hospitals would report being involved in internal governance, policy decision, and committees. A prior study suggested that there was no relationship between nurse participation subscale and quality of nursing care. McCusker et al. (2004) confirmed the five work environment subscales proposed by Lake (2002), and to assess their performance in comparing the work environment across different units in the same hospital. Data were derived from a cross-sectional survey of 243 nurses from 13 units of 300-bed university-affiliated hospital in Quebec, Canada, during 2001. The results revealed that after controlling for nurse characteristic, the unit level nurse participation subscale was not statistically associated with quality of nursing care at the last shift.

Nursing foundations for quality of care subscale: this subscale measures the degree to which nurses perceive a foundation for a high standard of patient care based on a nursing model. A formal quality assurance program is established, continuous learning opportunities are available, and new staff is well oriented. A prior study presented that there was no relationship between nursing foundation subscale and quality of nursing care. The findings from McCusker et al. (2004) revealed that after controlling for nurse characteristic, the unit level nursing foundation subscale was not statistically associated with quality of nursing care at the last shift.

Nurse manager ability, leadership, and support of nurses subscale. this subscale related to the leadership and management skill of the administrative person directly supporting nursing. A skillful leader and manager helps resolves conflicts among staff, especially with a physician, addresses mistakes systematically rather than judgmentally, and praises nurses when recognition is due. Prior studies showed that there were inconsistency of the relationship of nurse manager ability subscale for job satisfaction of nurses, nurse burnout, and quality of nursing care. Result from McCusker et al. (2004) showed that after controlling of nurse characteristic, the unit level nurse manager ability subscale was not statistically associated with quality of nursing care at the last shift. Furthermore, Bruyneel et al. (2009) indicated the effect of the nurses' work environment and nursing staff deployment on nurse recruitment, retention, and productivity; and on patient outcomes in 11 European countries. The results revealed at multivariate level and adjusted model, nurse manager ability subscale was not statistically associated with high job satisfaction, excellent nurse-perceived quality of care, and burnout (emotional exhaustion).

Moreover, Friese (2005) examined practice environments and outcomes of nurses working in oncology units or Magnet hospitals in order to understand the association between the two. A secondary analysis of survey data collected in 1998 was conducted. The sample was 1,956 registered nurses of whom 305 worked in oncology units in medical and surgical units of 22 hospitals in the U.S. The findings revealed that nurse manager ability was a significant predictor for job dissatisfaction ($p<0.01$). However, this subscale was not significant predictors for emotional exhaustion and quality of care as good or excellent.

Based on literature in Thailand, nurse leadership is associated with job satisfaction of nurses. Kaewnak (1998) investigated the head nurse management style and job satisfaction of staff nurses in Northern Regional Center hospitals. The results revealed that the management styles of head nurses as perceived by staff nurses had high positive correlation with job satisfaction of staff nurses ($r = .72$, $p < .001$). Furthermore, Banthet (1999) conducted a relationship study between nursing director supervision and job satisfaction of head nurses. Findings showed that there was positive relationship between the over all score of nursing director supervision and job satisfaction of head nurses in community hospitals ($r = .42$, $p < .01$). Panuwatsuk (2003) examined the relationships between working factors, participative leadership of head nurse, organizational support, and job satisfaction of staff nurses and analyzed predictors of job satisfaction of staff nurses in hospitals under the Jurisdiction of the Department of Medical Services, Bangkok Metropolitan Administration. Results revealed that participative leadership of the head nurse was positively and significantly related to job satisfaction of staff nurses ($r = .49$, $p < .05$).

There are some studies in Thailand presenting relation between nurse leadership and nurse burnout. Chaichitamorn (1999) conducted a study of the effects of work environment and social support upon burnout among nurses in intensive care units in governmental hospitals and found that received support from head nurse and peers were negatively correlated with burnout significantly ($p < 0.05$). On the other hand, Raksasook (2001) studied relation between work environment and burnout of professional nurse in community in hospital region 3. Results showed that work related factor in leadership of nurse manager was not related with burnout of professional nurses.

Collegial nurse-physician relations subscale: this subscale related to a positive and collaborative working relationship between nurses and physicians. Friese (2005) examined practice environments and outcomes of nurses working in oncology units or Magnet hospitals in order to understand the association between the two. The findings revealed that oncology nurses who responded favorably on collegial nurse-physician relations subscale were more likely to have high quality of care (OR = 2.41, 95% CI = 1.42, 2.50), $p<0.01$.

However, this subscale was not significant predictor for high emotional exhaustion and job dissatisfaction. McCusker et al. (2004) confirmed the five work environment sub-scale proposed by Lake (2002), and to assess their performance in comparing the work environment across different units in the same hospital. The results revealed that after controlling for nurse characteristic, the unit level nurse-physician relations subscale was not statistically associated with quality of nursing care at the last shift.

Furthermore, Kanai-Pak et al. (2008) described nurse burnout, job dissatisfaction and quality of care in Japanese hospitals and to determine how these outcomes are associated with work environment factors. Results presented that in a multivariate or adjusted model, effect of a one unit decrease in nurse-physician relations is associated with odds ratios 1.35, 13.9, and1.40 increase in burnout, job dissatisfaction, and poor or fair quality of care. Bogaert et al. (2009a) studied the relationship between nurse work environment, job outcomes and nurse-assessed quality of care in 155 nurses across 13 units in three Belgian hospitals. Logistic regression analyses was used to explore the relationships between the three subscales of the nurses' work environment and job-related items and found that after controlling

for nurse characteristics, nurse- physician relations had a significant positive association with the satisfaction of nurses with their current job (OR=8.8, 95%CI=1.26, 29.6, p<0.01), and the nurse-assessed quality of care on the unit level (OR 7.7, CI=3.3, 17.5, p<0.01). Linear regression analyses examined the relationship between the three subscales of the nurse work environment and the three subscales of the MBI. The finding found that after controlling for nurse characteristics, nurse-physician relations subscale had a significant negative association with emotional exhaustion (B=-3.7, p<0.01) and positive association with personal accomplishment (B 3.2, p<0.01) but not significant with depersonalization.

In addition, Bruyneel et al. (2009) studied the predictive validity of the instrument used in the International Hospital Outcomes Study (IHOS) for an upcoming EU-funded project, which will indicate the effect of the nursing work environment and nursing staff deployment on nurse recruitment, retention, and productivity; and on patient outcomes in 11 European countries. Results presented that nurse-physician relationship was significantly associated with high job satisfaction and excellent nurse-perceived quality of care, at the multivariate level. A 1-point increase in the average rating nurses gave to nurse-physician relationship factor was significantly associated with approximately a 2.53-fold (OR=2.53, 1.29-4.93; p<0.01) increase in the odds of reporting high job satisfaction, and 4.02-fold (OR=4.02, 95% CI 1.85-8.70; p<0.001) increase in the odds of reporting excellent nurse-perceived quality of care. However, this subscale was not significant associated with burnout.

In Thailand, Sanpornchaipong (2002) revealed that work environment in the relationship dimension was one of variables that can predict work satisfaction of

staff nurses in in-patient departments in community hospitals in the central region. Similarly, Hasithawech (2003) indicated association of work environmental factors and burnout of nurses. Findings found that work relationship was statistically associated with burnout levels in emotional exhaustion, depersonalization, and lack of personal accomplishment ($p<.05$). However, Raksasook (2001) studied relation between work environment and burnout of 302 professional nurses in community hospitals in region 3 and found that personal interrelationship was not related with burnout of professional nurses. So that prior evidences displayed that there are inconsistency of the results from the relationship between collegial nurse-physician relations and job satisfaction of nurses, emotional exhaustion, and quality of nursing care. Moreover, the study about association of collegial nurse-physician relations on depersonalization and personal accomplishment is limited.

In summary, nurses' work environment in this study is defined as the organizational characteristics of a work setting that facilitate or constrain professional nursing practice as proposed in the 2007 Thai Nurse dataset (Aungsuroch & Wanant, 2007). The Practice Environment Scale of Nurse Work Index (PES-NWI) was chosen to measure the nurses' work environment because it is the most useful instrument at present. The PES-NWI is used to describe and compare nurses' work environment in different settings and as part of the annual nurse survey for US national database of nursing quality indicators. The PES-NWI was developed to measure the nurse work environment that will facilitate professional nursing practice, enhance the quality of patient care, and improve outcomes for both nurse and patient. Although there are many studies in Thailand investigating the association of nurses' work environment with job satisfaction of nurses and nurse burnout, the findings from those variables

have been somewhat inconsistent. This may be because empirical studies have conceptualized the nurses' work environment in different ways. Almost all prior studies have analyzed the nurses' work environment as different components. Importantly, the association of nurses' work environment based on the PES-NWI and nurse and patient outcomes in Thai hospitals has not been investigated. This study will added new knowledge about nurses' work environment from Thai nurse' perspective and how nurses' work environment affects job satisfaction of nurses, nurse burnout, and quality of nursing care.

Nurse Staffing Levels

Definition of Nurse staffing levels

Nurse staffing and the care provided by nursing personnel are central to the provision of quality patient care in the health care system. Early definitions suggested that nurse staffing involved the provision of the appropriate amount and type of care by persons possessing the requisite skills to the largest number of patients possible in the most cost efficient and humanly effective manner consistent with desired patient outcomes and personnel needs for satisfaction (U.S. Department of Health, Education, and Welfare [USD-HEW], 1978 as cited in McGillis, H. L., 2005). Similarly, Giovannetti (1978) stated that nurse staffing involved the numbers and kinds of personnel required to provide care to the patient or client. Moreover, nurse staffing has also been described as the process of determining the appropriate number and mix of nursing resources to meet the workload demand for nursing care on the patient care unit (Jelinek & Kavois, 1992).

Nurse staffing levels is defined as the number or amount of nursing personnel designated for either a given nursing unit or shift (Giovanetti, 1984). There are two basic types of staffing levels.

First, the number of nurses relative to patient volume is presumed to reflect the average amount of nursing time patients receive. Such measure is commonly reported as patient to nurse ratios, full-time equivalent (FTE) positions worked in relation to average patient census (ADC) over a particular time period, and hours of care per patient day (HPPD). Because there are different types of nursing personnel, some specificity is needed regarding what types of workers are being examined (RNs, practical nurse, unlicensed staff, or all of these).

Second, qualification of the nursing staff assigned to care for patients can be considered in terms of license levels or education as a proportion of licensed versus unlicensed workers, registered versus unlicensed workers, or registered versus practical or vocational nurses. These categories of measures are often referred to as skill mix indices (Clarke, 2007).

A nurse manager must make skilled staffing decisions to ensure that safe and effective care is provided by the appropriate level of nursing professionals. Substantial evidence has been reported that the appropriate nurse staffing levels are associated with desirable patient and nurse outcomes. In any practice setting, there is an increased focus on manager accountability for establishing and monitoring effective and efficient staffing systems. Adequate staffing makes high-quality professional nursing care possible to have the time to deliver the kind of care nurses expect of themselves. When this is not possible, nurses often feel frustrated and betrayed by management (Laschinger et al., 2003). The association of nurse staffing

levels with the rescue of patients with life-threatening conditions suggests that nurses contribute importantly to surveillance, early detection, and timely interventions that save lives.

According to basic types of nurse staffing levels, there are numerous common ways of accounting for nurse staffing levels; however, nurse and patient ratios, total nursing staff or hour of care per patient day (HPPD), and nursing skill mix were generally used to measure the influence of nurse staffing levels on nurse and patient outcomes.

Patient to Nurse Ratio. Patient to nurse ratio is defined as number of patients cared for by one nurse, typically specified by job category (RN, licensed Vocational or Practical Nurse-LVN or LPN); this number varies by shift and nursing unit. Some researchers use this term to mean the number of patients cared for by one nurse per shift, FTE per 1,000 patient days, and nurse per patient day or FTE per occupied bed (Kane et al., 2007; Seago, 2001). Another commonly used measure is the number of patients for whom one nurse has direct responsibility at any one time (Lankshear, Sheldon, & Maynard, 2005).

Previous researchers have found a relationship between patient to nurse ratio and patient outcomes. For instance, a meta-analysis examining associations of nurse staffing with patient outcomes in hospital practice from US. and Canada from 1990-2006 by Kane et al. (2007) revealed that after adjustment for patient and provider characteristics an increase in patient to registered nurse (RN) ratios was associated with patient outcomes including a reduction in hospital-related mortality, failure to rescue, medical complications, unplanned extubation, pulmonary failure, hospital-acquired pneumonia, extended length of stay, and cardiopulmonary

resuscitation. Several studies addressed the relationship between patient to nurse ratio and nurse outcomes including nurse burnout and job satisfaction, and patient outcomes such as nurse-assessed quality of nursing care (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Aiken et al., 2002; Fyn et al., 2009; Rafferty et al., 2007; Sheward et al., 2005; Sochalski, 2004).

Total Nursing Staff or Hours of Care Per Patient Day (HPPD). Total nursing staff or hours per patient day is defined as all staff or all hours of care including RN, LVN, and aides counted per patient day (a patient day is the number of days any one patient stays in the hospital, for example, one patient staying 10 days would be 10 patient days). A study by Kane et al. (2007) addressed that an increase in total nurse hours per patient day was associated with patient outcomes including reduced hospital mortality. An increase in RN hours per patient day was associated with patient outcomes such as a reduction in relative risk of hospital acquired pneumonia, pulmonary failure, unplanned extubation, failure to rescue, and deep venous thrombosis. The LOS in hospitals was lower for additional total nursing, but not for licensed LPN/LVN and unlicensed assistive personnel (UAP) hours. The association between RN hours and LOS was not consistent across studies.

Furthermore, Sovie and Jawad (2001) investigated both the impact of restructuring on the organization and delivery of patient care and that of nursing structure and processes on the incidence of falls, nosocomial infections, pressure ulcers, and UTIs. Examining data from 29 university hospitals for more than 2 years, they found that increased RN hours worked per patient day was associated with lower fall rates although these were " minimal" when the levels reached 6 RN HPPD. Higher patient satisfaction level was seen when RN hours worked per patient day

increased from 4-4.5 to the 5-6 hour range. Lower urinary tract infection rates were also associated with an overall rise in nurse staffing numbers. Cho, Ketefian, Barkauskas, & Smith (2002) investigated the effects of nurse staffing on adverse events, morbidity, mortality, and medical costs and found that an increase of 1 hour worked by registered nurses (RN) per patient day was associated with 8.9% decrease in the odds of pneumonia. Providing a greater number of nursing hours per patient day was associated with a 13% increase in odds of pressure ulcers. Similarly, Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky (2002) used administrative data from 799 hospitals in 11 US states (representative 26% of all US hospitals) to examine the relationship between the amount of care provided by nurses at the hospital and various nurse-sensitive patient outcomes. Among surgical patients, higher numbers of licensed nurse (RN+LPN) hours was strongly associated with a lower failure to rescue rate and more weakly, but still significantly, with lower rates of pneumonia and urinary tract infections. It found no association with mortality. In addition, one study has presented the relationship between HPPD and job satisfaction of nurses (Parrinello, 1990).

Nursing Skill Mix. Nursing skill mix defined as the proportion or percentage of hours of care provided by one category of caregiver divided by the total hours of care (A 60% RN skill mix indicates that RNs provide 60%of the total hours of care). Much of research on skill mix is associated with patient outcomes. Lankshear et al. (2005) provided a useful introduction to the evidence base on nursing skill mix and outcomes. Their systematic review identified 422 publications since 1990, of which 22 involved multi-site acute hospitals and were adjusted for case mix. This review suggested that a richer skill mix, especially of RNs, was associated with

improved patient outcomes. Aiken, Smith, and Lake (1994) found that magnet hospitals in US. had a lower mortality rate than non-magnet hospitals, and possess qualities such as a greater proportion of RNs in their staff mix, which could have contributed to the lowered mortality. Blegen and Vaughan (1998) studied 39 medical surgical units and intensive care units in 11 hospitals, all of which routinely submitted adverse event data to the Institute for Quality Health care. Using case-mix-adjusted data from 1993 to 1995, they found a significant inverse relationship between the proportion of RNs and medication administration errors and patient falls. As the RN proportion varied from 50% to 85% the rate of medication errors decreased but above this, the effect disappeared. In examining the data set for 46,941 patients discharged from 75 Ontario hospitals (after controlling for patient comorbidities and hospital characteristics). Tourangeau, Giovannetti, Tu, and Wood (2002) found that a richer skill mix of RNs was associated with lower 30-day mortality.

Moreover, using administrative data of over 6 million discharges from 799 US hospitals, Needleman, et al. (2002) found that a higher proportion of RN care correlated with a reduction in UTIs, pneumonia, and upper gastrointestinal bleeding among medical patients. In surgical patients, the researchers noted that a higher proportion of RN hours was strongly associated with a lower failure-to-rescue rate and lower rates of pneumonia and UTIs. Cho, et al. (2003) further predicted that a 10% increase in RN proportion was associated with a 9.5% decrease in the odds of pneumonia, although no significant associations was noted between the proportion of RNs and other adverse events such as wound infection, urinary tract infections and pressure ulcers. A curvilinear relationship was also noted in another US study, in which increasing RN levels had a diminishing marginal effect on reducing in-hospital

mortality (Mark, Harless, McCue, & Xu 2004). Estabrooks, Midodzi, Cummings, Ricker, and Giovannettii (2005) revealed that after adjustment for patient comorbidities and demographic factors, and the size, teaching, and urban status of the study hospitals in a fixed-effects model, hospitals with a higher proportion of richer skill mix (i.e. higher RN-to-non-RN ratios) were associated with lower rates of 30-day patient mortality, OR =0.83 (95% CI 0.73, 0.96).

In conclusion, even though previous literature points out that patient to nurse ratio, HPPD, and nursing skill mix are usually used to estimate nurse staffing levels and they are associated with nurse and patient outcomes, this study aims to measure staff nurses who provide nursing care for patients. Patient to nurse ratio has been considered to calculate nurse staffing levels in this study because of the following reasons. HPPD reflects average staffing across a 24 hour period and does not reflect fluctuations in census, scheduling patterns, or absenteeism. Not all productive nursing hours are spent at the bedside. Nurses may be engaged in activities such as education, administration, and quality assurance. Thus, HPPD is likely to overestimate the actual amount of bedside care, and the magnitude of the discrepancy may vary from hospital to hospital (Hodge et al., 2004; Kravitz & Sauve, 2006). Moreover, nursing skill mix does not differentiate between nurses who provide direct care at the bed side and those with no patient care responsibilities. To measure nurse staffing from staff nurses who provide nursing care for inpatients, patient to nurse ratio, the number of patients for whom one nurse has direct responsibility at any one time, generally was applied. The mean patient load across all staff registered nurses is superior to those derived from administrative databases, which generally include registered nurse positions that do not involve inpatient care at bedside (Aiken, Clarke,

Sloane, Sochaski, et al., 2002; Kovner & Gergen, 1998; Kovner, Jones, Chunliu, Gargen, & Basu, 2002). Therefore, patient to nurse ratio will be referred to nurse staffing levels in this study.

Patient to nurse ratio was used to measure nurse staffing levels in many settings. The study of Rafferty et al. (2007) presented average hospital-level workloads ranged from 6.9 to 14.3 patients per nurse across 30 English acute trusts. Sheward et al. (2005) stated that mean of the number of patients the responding nurse was personally responsible for on the last shift in Scotland and England were 9.4 and 10.0, respectively. Fynn, et al. (2009) presented that mean and range of patient to RN ratio among nurses in U.S. chronic hemodialysis centers was 9.6 (1-48). Aiken, Clarke, and Sloane (2002) revealed that mean and range of the number of patients assigned per nurse on last shift was 6.3 (1-20) in Pensylvania, 7.1(1-20) in Ontario, 7.0 (1-20) in British Columbia, 9.9 (1-20) in England, and 9.7 (1-20) in Scoltland. Sochalski (2004) displayed mean and range of patient workload in acute care hospitals in Pennsylvania was 5.3 (1-20).

Objectives of nurse staffing are excellent care and high productivity. To forecast nurse staffing, many variables are considered. These variables include workload, Nursing Care Hour Per Patient Day (NHPPD), acuity level of patient, skill mix, and staff allocation. The patient classification systems have been developed for describing the acuity of patients. Sicker patients receive higher classification scores, indicating that more nursing resources are required to provide patient care. In the U.S., there are external and internal organization variables that nurse managers must consider producing staffing plans. External variables are state licensing standards, JCAHO and other regulatory agency standards, American Nurses Association

Standards, and consumer expectations. These standards are related to the minimum number of professional nurses required on unit at a given time or to the amount of minimum staffing in an extended care facility or prison to continuously improve the safety and quality of care provided to the public. Moreover, consumer expectations create another variable that nurse managers must consider as they prepare personnel budget. Internal organization variables that affect staffing plans are organizational staffing policies, structure and philosophy of the nursing services department, organizational support systems, changed in services that will be offered, and workload (Yoder-Wise, 2003).

In Thailand, the Division of Nursing, Ministry of Public Health (2002) stated that around 80 percent of Thai public hospitals used the patient classification system to compute in formula that calculates for nurse staffing. The Division of Nursing released guidelines for nurse staffing and the patient classification system is encouraged to determine nurse staffing level in each nursing unit (Division of Nursing, Ministry of Public Health, 2002). Furthermore, the TNC (2005) recommended that in secondary care hospitals the minimum NHPPD were 4-6, 6, 12 in in-patient departments, psychiatric and special-departments, and adult and child intensive care units respectively. Also, the TNC (2005) established minimum patient to nurse ratios to be implemented were 4:1 to 6:1, 4:1, and 2:1 in in-patient department, psychiatric and special-department, and adult and child intensive care units respectively. The percentage for staff mix of RN: Non RN ratio could be 100:0, 80:20, 70:30, 65: 35, or 60:40 depending on severity of patient in each unit. For tertiary care hospitals, the TNC (2005) recommended that the minimum NHPPD were 4-6, 6, 12, and 16 in in-patient departments, psychiatric and special-departments, adult

intensive care units, and child intensive care units, respectively. The TNC (2005) established minimum patient to nurse ratios to be implemented were 4:1 to 6:1, 4:1, 2:1, and 1.5:1 in in-patient departments, psychiatric and special-departments, adult intensive care units, and child intensive care units, respectively. The percentage of staff mix of RN: Non RN ratio could be 100:0, 80:20, 70:30, 65: 35, or 60:40 depending on severity of patient in each unit. Previous studies in Thailand about nurse staffing presented nurse staffing based on the patient classification systems and the time spent among nursing personnel in different unit and settings.

Effects of Nurse Staffing Levels on Outcomes

Nurse staffing level is used as a structural component that effects nurse and patient outcomes. Several studies have suggested that nurses in hospitals supporting higher nurse staffing levels (patient to nurse ratio) had higher job dissatisfaction of nurse, higher nurse burnout, and higher quality of nursing care as poor. Summary of these studies is delineated as follows:

Aiken, Clarke, and Sloane (2002) examined the effects of nurse staffing and organizational support for nursing care on nurses' dissatisfaction with their jobs, nurse burnout (emotional exhaustion), and nurse reports of quality of patient care in an international sample of hospitals. Multisite cross-sectional survey was undertaken in 10,319 nurses working on medical and surgical units in 303 hospitals in the United States (Pennsylvania), Canada (Ontario and British Columbia), England, and Scotland. Results revealed that better staffing is positively associated with higher nurse-assessed quality of care. Nurse in the worst-staffed hospitals were 1.35 times as likely as those in the best-staffed to rate the quality of care on their units as fair or

poor, once organization is controlled. However, nurse staffing was not associated with nurse report dissatisfied with current job and have burnout score above published norms for medical personnel.

Similarly, Aiken et al. (2008) analyzed the net effects of nurse practice environments on outcomes including job satisfaction of nurses, burnout (emotional exhaustion), intent to leave, and reports of quality of care, as well as mortality and failure to rescue in patients after accounting for nurse staffing and education. Data from 10,184 nurses and 232,342 surgical patients in 168 Pennsylvania hospitals were analyzed. Findings revealed that after controlling for the effects of care environment as well as nurse and hospital characteristics the odds of nurses reporting job dissatisfaction, high emotional exhaustion, and quality of nursing care as poor or fair increased by roughly one-tenth, two-tenth, and third-tenth, respectively, with each increase of one patient per nurse in mean workloads in their hospitals.

Aiken, Clarke, Sloane, Sochaski, et al. (2002) determined the association between the patient to nurse ratio and patient mortality, failure to rescue (death following complications) among surgical patients, and factors related to nurse retention. This study was secondary data analysis and cross-sectional analyses of linked data from staff nurse, patient data, and hospitals in Pennsylvania. Results revealed that after adjusting for nurse and hospital characteristics, each additional patient per nurse was associated with a 15% (OR, 1.15; 95% CI, 1.07-1.25) increase in the odds of job dissatisfaction. Each additional patient per nurse was associated with a 23 % (OR, 1.23; 95% CI, 1.13-1.34) increase in the odds of burnout (emotional exhaustion).

Furthermore, Sochalski (2004) examined the effects of nurse staffing and process of nursing care indicators on assessments of the quality of nursing care. Secondary analysis of data derived from a 1999 statewide survey of 8,670 inpatient staff nurse working in acute care hospitals in Pennsylvania was undertaken. This study found that quality of nursing care ratings was significantly associated with the number of patients who nurses care for ($r = .317$, $p < 0.001$). The addition of each patient to the nurse's workload is associated with a .07 point decline in quality scores, and this effect was statistically significant. Mean quality scores declined from 3.6 (excellent/good) to 2.7 (good/fair) as the number of patients cared for rose from 1 to 10 and plateaued after that point.

Sheward et al. (2005) explored the relationship between UK hospital nurse staffing and emotional exhaustion and job dissatisfaction. Results suggested that significant relationships were found using the combined English and Scottish data between nurse to patient ratios and emotional exhaustion and dissatisfaction with current job as reported by nurses. In analysis, after controlling for nurse and hospital variables, the odds ratios for burnout increased from 0.57 to 0.67 to 0.80 to 1.00 ($p<0.05$) as the number of patients a nurse was responsible for increased from 0-4 to 5-8 to 9-12 to 13 or greater. The odds ratios for job dissatisfaction increased from 0.70 to 0.75 to 0.84 to 1.00 ($p<0.05$) as the number of patient a nurse was responsible for increased from 0-4 to 5-8 to 9-12 to 13 or greater.

Moreover, Rafferty et al. (2007) examined the effects of hospital-wide nurse staffing levels (patient to nurse ratios) on patient mortality, failure to rescue and job dissatisfaction, burnout (emotional exhaustion), and nurse-rated quality of care. This study was cross-sectional analysis combining 3,984 nurse survey data with

discharge abstracts from 118,752 patients in 30 English acute trusts. Results of the fully adjusted models, taking into account nurse and patient characteristics are nurses in hospitals with the highest patient to nurse ratios were approximately twice as likely to be dissatisfied with their jobs (OR=1.78, 1.35-2.37), to show high burnout levels (OR=1.71, 1.33-2.19), and to report low or deteriorating quality of care on their wards and hospitals (OR=1.92, 1.43-2.56), $p<0.001$.

Fynn, et al. (2009) investigated the effects of effects of workload, practice environment, and care processes on burnout (emotional exhaustion) among nurses in U.S. chronic hemodialysis centers. Findings indicated that the adjusted effects of higher patient to nurse ratios were not significantly associated with nurse burnout.

In Thailand, a study revealed the relationship between the ratio of total nurse staffing and outcomes. Sasichay-Akkadechanunt, et al. (2003) examined the relationship between nurse staffing and patient outcomes in university hospitals in Thailand. Findings showed that the ratio of total nurse staffing to patients was significantly related to outcomes of in-hospital mortality in both partial and marginal analyses, controlling for patient characteristics (OR=.29, $p<.01$; and OR =.28, $p<.01$, respectively).

A recent study presented the association of nurse staffing including nursing working hours per patient day, the proportion of expert position professional nurses to all professional nurses with nurses' job satisfaction, and patient outcomes. Chitpakdee (2006) identified the relationships between nurse staffing, nurses' job satisfaction and selected patient outcomes as well as identify the predictive models of patient outcomes derived from nurse staffing variables in 98 medical and surgical nursing units of 15 hospitals located in the northern region of Thailand. The results revealed

that nursing working hours per patient day were positively related to patient falls, pressure ulcers, UTIs, and patient satisfaction, while the proportion of professional nurses to all nursing personnel was negatively associated with patient falls. The proportion of expert position professional nurses to all professional nurses was negatively correlated to patient falls, pressure ulcers, and UTIs, while the relationship between the proportion of master prepared nurses to all professional nurses and patient outcomes was not found. The proportions of expert position professional nurses to all professional nurses were positively related to nurses' job satisfaction.

Only one study investigated the relationship between nurse to patient ratio and nurse and patient outcomes. Khumya (2002) explored the relationship among nurse staffing, job satisfaction of nurses, and patient satisfaction with nursing care in in-patient units of public health hospital and found that a positive association between nurse to patient ratio with patient satisfaction was the only statistically significant statistic found in this study ($\beta = .314$, $p < .05$). However, the researcher revealed that both nurse to patient ratio and the proportion of RNs were not statistically significantly related to job satisfaction of nurses.

In summary, nurse staffing levels in this study is defined as the number of patients cared for by one nurse in a nursing unit as proposed in the 2007 Thai Nurse dataset (Aungsuroch & Wanant, 2007). Patient to nurse ratio, the number of patients per a nurse which is determined by the mean patient load across all staff nurses in a hospital, has been chosen to measure nurse staffing levels because it is able to draw staff nurses who provide nursing care for patient. Literature review suggested that patient to nurse ratio related to job satisfaction of nurses, nurse burnout, and quality of nursing care. Additionally, there is a limitation of the number of studies of

relationships between nurse staffing levels, particularly nurse to patient ratio, and nurse and patient outcomes in Thailand.

In conclusion, previous studies in the United State, Canada, or European countries have been presented the association between nurse and patient outcomes and the nurses' work environment and nurse staffing levels. However, the nursing situations in Thailand differ from those countries. Thailand is developing country located in south-east Asia. Thai health system is based on the sufficiency economy philosophy which is a holistic development system linking economic, social, cultural, and moral dimensions. Public sector health facilities play a crucial role in the health service system as they provide health services to the people in all localities with good accessibility and coverage, particularly in remote areas. State services include those provided by the Ministry of Public Health at specialized hospitals, regional hospitals, general hospitals, community hospitals, and subdistrict health centers, and by other ministries. Private health facilities play a significant role in providing health services in urban areas, especially those with a good economic status. Nurses and midwifery personal comprise 70% of all the health personnel of Thailand's health care system. Their responsibilities include health promotion, disease prevention, care and rehabilitation of patients both in hospitals and in the community. Nurses include registered nurses who most of nurse education background was bachelor degree and technical nurse who graduated diploma of nursing science. Nurses work three rotating eight hour shifts. Therefore, above reasons may cause the study in Thailand differ from international studies.

Literature review in Thailand revealed the situation of job satisfaction of nurses, nurse burnout, quality of nursing care, nurses' work environment, and nurse

staffing levels. Substantial studies suggest that nurses' work environment is related to job satisfaction of nurses and nurse burnout; however, there is inconsistency of findings. This may be due to the different ways of measuring nurses' work environment and job satisfaction of nurses. The relationship between nurses' work environment and quality of nursing care has never been investigated in public hospitals in Thailand. Studies illustrated a significant relationship between nurse staffing levels particularly patient to nurse ratio and job satisfaction of nurses, burnout, and quality of nursing care in Thai hospitals is absent. Importantly, international studies have documented an association between nurses' work environment and nurse staffing for nurse and patient outcomes, little is known about this relationship in public hospitals in Thailand. Therefore, this study fills an important knowledge gap.

The Conceptual Framework of the Study

The conceptual framework that guided this study is adapted from the QHOM (Mitchell et al., 1998) and from the existing body of evidence. The QHOM model was conceptualized that system influence care provided by nurses and in turn to affect the outcomes. This study focused on the relationship between the system and outcomes components. The system components include the nurses' work environment and nurse staffing levels. Nurses' work environment is defined as the organizational characteristics of a work setting that facilitate or constrain professional nursing practice (Lake, 2002). Those characteristics include nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership, and support for nurses, and collegial nurse-physician relations. Nurse staffing levels is the number of patients cared for by one nurse in a nursing unit (patient to nurse ratio). The outcome components include job satisfaction of nurses, burnout, and quality of nursing care. Job satisfaction of nurses is the perception individuals have regarding their job. Nurse burnout is staff nurses' perception to their emotional exhaustion, depersonalization, and personal accomplishment. Quality of nursing care is nurses' perceptions on quality of nursing care delivered to patient.

This conceptual framework can be explained that nursing care can be thought of as a health care organization's surveillance system for the early detection of adverse events (Clarke & Aiken, 2003). Nurse staffing levels influence the timing of problem identification, and timing is important in patient rescue. Nurses are expected at the bedside 24 hours a day, in the event of identification of an adverse event, nurses' intra-organizational status (system) supporting nurse participation in

hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership, and support for nurses, and collegial nurse-physician relations influences the extent to which they can marshal the resources of the hospital for response to intervene. The earlier the problem is detected and managed, the lower the probability of poor patient and nurse outcomes. The conceptual framework had been proposed that the presence that supportive organizational environment influenced in large part by managerial practices enhances the quality of nursing processes and result in superior outcomes. It has also been proposed that an adequate level of nurse staffing facilitates nurses' surveillance, likewise improving outcomes.

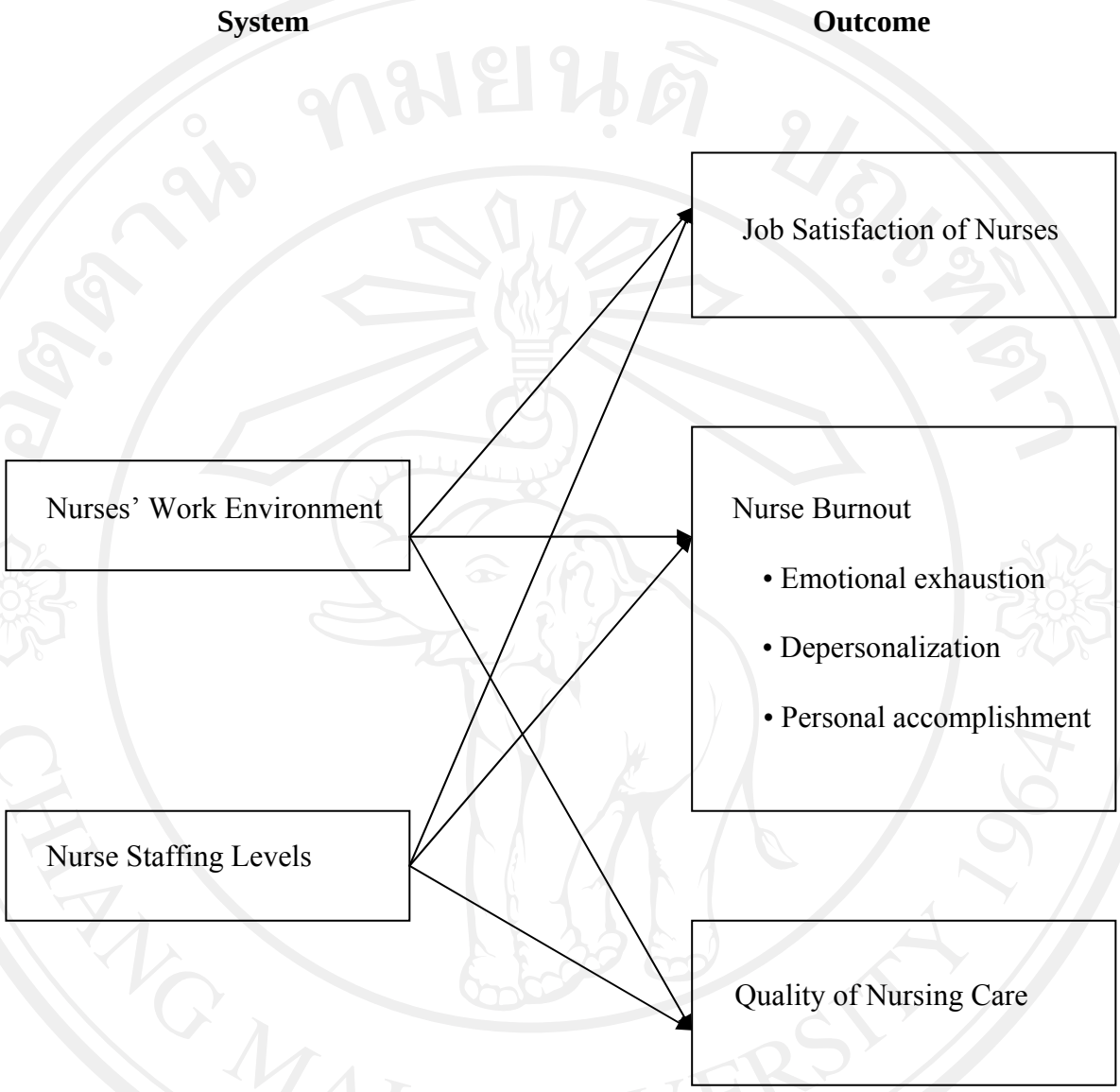

Figure 2. Conceptual framework of this study