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NURSING PRACTICE ENVIRONMENT AND PATIENT OUTCOMES: THE EXPERIENCE OF NURSES WORKING AT THREE TEACHING HOSPITALS, MALAYSIA

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ABSTRACT

Lately, increasing cases of adverse events are a patient safety issue in hospitals worldwide and require serious attention by the administrators in the healthcare sector. This study was carried out to assess the category of nursing practice environments (NPEs) and to assess the level of patient outcomes (POs) as perceived by nurses in teaching hospitals, Malaysia. It aimed to examine the relationship between NPEs and POs in hospital settings. This was a descriptive correlational study conducted in a two month period on 395 nurses (94.3%) who participated voluntarily in this study. Data were collected using a self-rated 45-item questionnaire that comprised of demographic data, the Practice Environment Scale of the Nursing Work Index and the Adverse Events Instrument to assess NPEs and negative outcomes respectively. The reliability and validity with Cronbach's alpha was 0.89 and 0.81. The study showed that the NPEs in teaching hospitals were mean score of 2.44, which describes nurses' perception as highly disagreeable and dissatisfaction with the characteristics of NPEs in their daily duty and suggested as a stressful environment. This study indicated that the level of POs was low with patient falls ($\overline{X}$ 1.55) and medication errors ($\overline{X}$ 1.59), whereas nosocomial infections ($\overline{X}$ 2.04) and patient complaints ($\overline{X}$ 2.15) were moderate. This indicates that POs in teaching hospitals need to be improved to gain more positive POs mainly on nosocomial infections and patient complaints. The finding also showed the nurse manager ability, leadership and support of nurses were associated with patient falls ($r = -0.123$, $p = .015$), nurse-physician relations were associated with patient complaints ($r = -0.105$, $p = .038$) and overall NPEs was associated with patient complaints ($r = -0.116$, $p = .021$). In other words, the more satisfaction towards their NPEs as well as the more agreeable for each domain contributed to decrease adverse events and this translated to better POs. These results suggest that stressful environment for nurses is a serious problem which should be addressed in order to create a healthy NPEs for nurses as the key to improve POs and encourage nurses to be more satisfied and joyful in their practice environment.

Key words: nursing practice environment, patient outcomes, nurses

INTRODUCTION

Despite most healthcare provider's holding to the principles of 'do no harm', patient's safety issue that called as adverse events from medical care appears to pose a substantial burden to the world's population *(Department of Health 2004; World Health Organization 2008)*. Statistics show that there were 185,000 patients from 2.5 million admissions reported had experienced an adverse event in Canada *(Baker, Norton & Flintoft 2004)*; nosocomial infections, failure-to-rescue or complications occurred in more than 850,000 of yearly admission in Britain's National Health Service hospitals *(Department of Health 2000)*; and patients harmed proportion was higher in developing countries *(WHO 2009)*. In hospitals

across Malaysia, 2,572 cases of medication errors were reported and it was identified as the main adverse event issue that impacted patient outcomes in 2009 *(New Straits Times 16 March 2010, p. 23)*.

Patient outcomes (POs) are the results of care structures which are environmental and include processes that integrate functional, social, physical, psychological and physiologic aspects of people's experience in positive outcomes and adverse events *(Mitchell, Ferketich & Jennings 1998)*. The adverse events refer to results that show the occurrence and frequency of negative patient incidents which uses nursing-sensitive indicators to assess outcomes sensitive to nursing care *(Laschinger & Leiter 2006)*. In this study, the researchers were focused on adverse events rather than positive POs because adverse events data are documented in medical records in various hospitals worldwide *(Needleman et al. 2001)*.

In today's complex healthcare environment, it is important to explore patient safety associated with hospitalization factors which would reflect on differences in patients' experience receiving treatment and care from multiple healthcare providers in hospitals that contribute to POs *(Thornlow 2005)*. As reported in literature, several factors have impacts on POs during hospitalization such as coordination of care *(Yen & Lo 2004)*; heavy workload *(Pekkarinen et al. 2008)*; staffing *(Needleman et al. 2002; Thungjaroenkul et al. 2008)*; and leadership practice *(Houser 2003; Wong & Cummings 2007)* that result in patients receiving either positive outcomes or adverse events *(Stone et al. 2007)*. The major factors reported influencing nurses in doing interventions and providing care to patients in the wards is nursing practice environments *(Huycke & All 2000; Lucero, Lake & Aiken 2009)*.

Nursing practice environments (NPEs) refer to the organizational characteristics of a work setting that facilitates or constrains professional nursing practice from delivering care to patients *(Lake 2002)*. Nurses who rated and felt that their wards had a positive or healthy practice environment were more committed to the organization, more satisfied, can create a culture of safety and were able to provide the highest quality of care *(Laschinger et al. 2000)*. In Malaysia, a study indicated 49.5% of nurses in a public hospital in Kuala Lumpur had stressful experiences related to NPE factors *(Rokiah 1994)* and nurses in a medical and surgical department in a teaching hospital, Kuala Lumpur reported workload as a major source of stress in their practice environment *(Emilia & Noor Hasim 2007)*. On the other hand, *Laschinger* and *Leiter's (2006)* study indicated that the quality of NPE could decrease patient falls, nosocomial infections, medication errors and patient complaints. A study by *Manojlovich & DecCicco (2007)* showed that medication errors were significantly related to the practice environment scale. Whenever nurses' perception of positive NPE increased, medication errors decreased.

Based on aforementioned situations, this study aimed to assess the category of NPEs, to assess the level of POs and to determine the relationship between NPEs and POs as perceived by nurses in teaching hospitals, Malaysia.

MATERIALS AND METHODS

The study was conducted in three teaching hospitals, Malaysia over a two month period from January to February 2011, using descriptive correlational research design. Approval to conduct the study was obtained from the Institute Review Board (IRB), Chiang Mai University and the Medical Research and Ethics Committee teaching hospitals *(Project Code No. FF-017-2011)*.

Stratified random sampling method was used to recruit samples and confidentiality was maintained throughout the study. A total of 395 nurses (94.3%) participated in the study, consisting of nurses from the eight departments: critical nursing, pediatric nursing, psychiatric nursing, emergency/ orthopedic nursing, operating room/ oncology, surgical/ ophthalmology/ ENT, obstetrics and gynecology, and medical nursing department in each teaching hospital. A self-rated 45 item questionnaire was used and subjects were given two days to complete the questionnaire.

The self administered questionnaire comprised of three parts: Part A, Part B and Part C. Part A collected the demographic data such as age, education level, working experience, involvement as committee member and working extra time were collected. Part B collected data using the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake 2002) which assessed NPEs whereas Part C collected data using the Adverse Events Instrument *(Laschinger & Leiter 2006)* and assessed adverse events as perceived by subjects.

The PES-NWI has 31 items on a four-point Likert scale and consists of five domains: 1) nurse participation in hospital affairs, 2) nursing foundations for quality of care, 3) nurse manager ability, leadership and support of nurses, 4) staffing and resources adequacy, and 5) collegial nurse-physician relations. Whereas the Adverse Events Instrument consists of four items: 1) patient falls, 2) medication errors, 3) nosocomial infections, and 4) patient complaints. For NPEs, the interpretation for each domain shows that mean score if > 2.50 means favorable and if ≤ 2.50 means unfavorable. Whereas the interpretation of the Adverse Events Instrument shows that mean score of 1.00 – 2.00 means low level of POs, mean score of 2.01 – 3.00 means moderate level of POs and mean score of 3.01 – 4.00 means high level of POs. The PES-NWI was translated by the researcher using back translation technique. Validity and reliability of instruments were tested. The Cronbach Coefficient alpha of the instruments was .89 and .81. Data were entry and were analyzed using descriptive statistics and Spearman's rank-order Correlation through the Statistical Package for Social Science (SPSS) software version 12.

RESULTS

A total of 395 subjects participated in this study. The majority of subjects, 236 (59.7%) were within the age group of 21–30 years, 363 (91.9%) of them were diploma nurses and 234 (59.1%) had experience in the nursing career for more than 5 years. Most of the nurses who took part in this study were working extra time such as 186 (47.1%) doing overtime, 100 (25.3%) working at other wards, 174 (44.1%) doing double shifts and 222 (56.2%) working during days off. There were less nurses involved in hospital affairs such as 9 (2.3%) being a member in quality assurance, 36 (9.1%) nurses in infection control, 52 (13.2%) nurses in CNE or 17 (4.3%) nurses in ISO (see Table 1).

The category of NPEs as perceived by nurses in eight departments from the three teaching hospitals is shown in Table 2. Overall NPEs was unfavorable ($\overline{X}$ 2.44) which shows four out of five subscales including nurse participation in hospital affairs; nurse manager ability, leadership and support of nurses; staffing and resources adequacy; and collegial nurse-physician relations were unfavorable ($\overline{X}$ 2.36; $\overline{X}$ 2.29; $\overline{X}$ 2.14; and $\overline{X}$ 2.50).

POs level from the nurses' perception about patients under their care over the past one year is shown in Table 3. It showed that there was a low level of patient falls ($\overline{X}$ 1.55) and a low level of medication errors ($\overline{X}$ 1.59), whereas a moderate level of nosocomial infections ($\overline{X}$ 2.04) and a moderate level of patient complaints ($\overline{X}$ 2.15).

The relationship between NPEs and POs is illustrated in Table 4. Overall, NPEs showed a significant weak negative correlation with patient complaints (r= –0.116, p=0.021). For NPEs domains, collegial nurse-physician relations were a statistically significant weak negative correlations with patient complaints (r= –0.105, p=0.038). There was a statistically significant weak negative correlation between nurse manager ability, leadership and support of nurses with patient falls (r= –0.123, p=0.015).

DISCUSSION

The main objectives of this study was to assess the category of NPEs, to assess the level of POs and to determine the relationship between NPEs and POs as perceived by nurses in teaching hospitals, Malaysia, which to our knowledge has not been studied earlier.

Category of nursing practice environments

Responses from nurses regarding five domains in NPE concepts showed that mean score of nurse participation in hospital affairs was 2.36, mean score of nursing foundations for quality of care was 2.91, mean score of nurse manager ability, leadership and support of nurses was 2.29, mean score of staffing and resources adequacy was 2.14 and mean score of collegial nurse-physician relations was 2.50. This indicated that nursing foundation for quality of care was above the mean score of 2.50 compared to the other domains and this was considered a favorable category, whereas the other domains were considered unfavorable. Considering the mean score on each domain of NPE, it reflects the nurses' agreement and satisfaction whether the characteristic of favorable NPE existed or not in the nurses' current job which may impact on work functioning in their daily practice. In the results of this study, overall NPEs in teaching hospitals were considered as unfavorable ($\overline{X}$ 2.44) which reveals high disagreement and dissatisfaction among nurses to the characteristics of NPEs.

Table 1: Demographic data: frequency and percentage of the characteristics of the sample

Characteristics	Frequency (n)	Percentage (%)
Age		
21 – 30 years	236	59.7
31 – 40 years	115	29.1
41 – 50 years	38	9.8
> 50 years	6	1.4
Education		
Diploma	363	91.9
Bachelor	32	8.1
Experience		
1.0-2.0 years	79	20.1
2.1-3.0 years	42	10.7
3.1-5.0 years	40	10.1
> 5.0 years	234	59.1
*** Committee member**		
Quality Assurance (QA)	9	2.3
Infection Control	36	9.1
Continuing Nursing Education (CNE)	52	13.2
International Standardization Organization (ISO)	17	4.3
*** Working extra time**		
Doing overtime	186	47.1
Working at other ward	100	25.3
Doing double shifts	174	44.1
Working during day off	222	56.2

** Subjects tick (√) more than one choice*

Table 2: Mean score, standard deviation, and categorization of nursing practice environment as perceived by nurses (n = 395)

Nursing practice environment	Mean	SD	Categorization
Nurse participation in hospital affairs	2.36	0.48	Unfavorable
Nursing foundations for quality of care	2.91	0.50	Favorable
Nurse manager ability, leadership and support of nurses	2.29	0.49	Unfavorable
Staffing and resources adequacy	2.14	0.49	Unfavorable
Collegial nurse-physician relations	2.50	0.57	Unfavorable
Overall of nursing practice environment	2.44	0.36	Unfavorable

Table 3: Mean score, standard deviation (SD), and level of patient outcomes

Patient Outcomes	Mean	SD	Level
Patient falls	1.55	0.83	Low
Medication errors	1.59	0.85	Low
Nosocomial infections	2.04	1.00	Moderate
Patient complaints	2.15	1.03	Moderate
Overall of patient outcomes	1.83	0.74	Low

Table 4: Relationship between nursing practice environment and patient outcomes (n = 395)

	Patient outcomes			
Nursing practice environment	Patient falls r	Medication errors r	Nosocomial infections r	Patient complaints r
Overall of NPE	–.062	–.089	–.051	**–.116***
Nurse participation in hospital affairs	–.058	–.092	–.079	–.065
Nursing foundations for quality of care	–.070	–.089	–.026	–.084
Nurse manager ability, leadership and support of nurses	**–.123***	–.090	–.004	–.072
Staffing and resources adequacy	–.001	–.052	–.023	–.072
Collegial nurse-physician relations	–.019	–.095	–.055	**–.105***

* $p < 0.05$

Therefore, according to the findings of this study, nurses rated the most number of disagreements and dissatisfaction of NPE domains and this suggested that the nurses' practice environment is unhealthy and stressful. This was supported by a study by *Rokiah (1994)* which demonstrated that more than 49.5% nurses in a public hospital in Kuala Lumpur agreed that NPE factors resulted in a stressful practice environment.

In this study, unfavorable NPEs was indicated with issues of less of nurses' opportunities to take part in hospital and nursing committees, inadequate supports from nurse manager to the nursing staff mainly in decision making and in conflict with a doctor, insufficient staffing, resources and time as well as less opportunity to discuss patient care problems with other nurses, heavy workload as well as inadequate teamwork between nurses and doctors were presented in NPEs and thus, may influence the subject to rate their environment based on their present situation in their hospitals or wards. The finding is consistent with the finding of *Friese et al. (2008)* and *Chiang & Lin's study (2008)* who demonstrated that NPE was unfavorable in nurses' daily practice although the health care system is different from Malaysia. This shows evidence that NPEs in teaching hospitals require improvement to reduce stress among nurses.

However, the finding related to the category of NPEs was contradicting and inconsistent with the findings of *Roche & Duffield (2010)* and *Aiken et al. (2008)*. The study by *Roche & Duffield (2010)* indicated that the category of NPE at general acute and mental-health wards in Australia was favorable. In contrast, *Aiken et al.'s (2008)* study revealed that the practice environment at medical-surgery, intensive care unit, and operating room as belonging to the mixed category. This difference might be due to the difference in cultural patterns, where most previous studies were conducted in modern and advance countries, where the development of technology and the nursing career is more advanced and progressive, whereas the present study was conducted in a Malaysia country. Socio economic characteristics may also contribute to the results in this study whereby Malaysia is a developing country and previous studies were mostly conducted in developed countries such as Japan, America, and Australia. Developed countries generally have advanced medical services which are easy to access as compared to developing countries where medical services are not as easily accessed *(Danny 2003; Department of Statistic & Economic Planning Unit 2010)*.

Level of patient outcomes

In this study indicated that the perceived level of patient outcomes was low level of patient falls (= 1.55) and low level of medication errors ($\overline{X}$ 1.59). The result is consistent with the study by *Aiken et al. (2001), Sochalski (2001), Laschinger & Leiter (2006)* and *Lucero, Lake & Aiken (2010)* that showed that patient falls and medication errors were reported to have a low average scoring than patient complaints and nosocomial infections. This was difficult to explain. Possibly in this study, both negative outcomes were under-reported. Most Malaysians were reluctant to admit their mistakes due to the repercussions thereafter. The similar result was shown from previous studies and this may be due to Malaysia having a prevention of patient falls and medication errors which is similar to prevention as in developed countries. For example, instituting training and education program to avoid patient falls or implementing of computerized medication orders to prevent errors.

Between nosocomial infections and patient complaints, the results showed moderate level of nosocomial infections ($\overline{X}$ 2.04) and moderate level of patient complaints ($\overline{X}$ 2.15). This finding is consistent with the study of *Yen & Lo (2004)* and *Pekkarinen et al. (2008). Yen & Lo's study (2004)* showed that poor coordination of care due to inadequate number of staffing and high workload, as well as lack of involvement from multiple providers in nurses' care activities may contribute to an increase in nosocomial infections and patient complaints between moderate to high level of PO. Meanwhile, a study by *Pekkarinen et al. (2008)* indicated that time pressure as referred to excessive workload, hard work and inadequate time to work was contributed by nurses attempting to maintain passive care routines and care practice. This also leads to an increase in nosocomial infections and patient complaints between moderate to high level of patient outcomes. The similarity between this study and the previous study might be because of nosocomial infections and patient complaints are the cases that commonly happen caused by the carelessness of nurses. It seems difficult to control because attitude and personality are individual characteristics which are hard to change without

individual willpower and determination. It also needs good cooperation from others healthcare providers for improvement of both outcomes.

Relationship between nursing practice environments and patient outcomes

This study examined the relationship between NPEs and POs as perceived by nurses. It found a significant weak negative correlation between overall NPEs and patient complaints. This is means that healthy nursing practice environments or called as favorable NPEs which not giving a stressful environment in nurses' practice are important to enhance patient outcomes mainly on patient complaints. It is supported by *Laschinger & Leiter's finding (2006)*, which revealed that all domains in nursing practice environments had a relationship with patient outcomes. The similar finding was also found from a study by *Manojlovich & DecCicco (2007)*, *Friese et al. (2008)* and *Aiken et al. (2008)* that showed that overall NPEs had a negative weak significant relationship with the POs in the wards setting.

In relation to the each domain of NPE, this study found a significant weak negative correlation between collegial nurse-physician relations and patient complaints. In other words, the more favorable the collegial nurse-physician relationship, the lower cases of patient complaints was reported. This finding is consistent with the previous finding from *Yen & Lo's (2004)* study that showed favorable collegial nurse-physician relationship was associated with lower length of stay when patients were hospitalized. Furthermore, the result in this study is also consistent with the findings of Lucero, *Lake & Aiken (2010)* but their study was focused on the relationship between nurses' report of unmet nursing care needs and nurses' reports of wrong medication or dose, nosocomial infections and patient falls with injury. It shows whenever met nursing care needs increase, the occurrence of adverse events in hospitals was decreased and that it translated to more positive patient outcomes.

On the other hand, the finding is consistent with nurse manager ability, leadership and support of nurses. There was a weak negative correlation between nurse manager ability, leadership and support of nurses and patient falls. The more favorable the nurse managers ability, leadership and support of nurses in the nurses' practice environment, the less cases of patient falls were reported. This finding is similar with a study by *Houser (2003)* and *Wong & Cummings (2007)*. From *Houser's study (2003)* it was demonstrated that the nurse manager who has ability, leadership skills and give support to her staffs had negative significant relationship with adverse events: pneumonia and urinary tract infection, medical errors and patient falls. Meanwhile, *Wong & Cummings's (2007)* study showed that nurse manager ability, leadership and support of nurses had negative significant relationship with adverse events: patient falls; medication errors and infection rates.

While this study can assist in our understanding to move forward on promoting and developing positive practice environment for nurses to be able to decrease the occurrence of adverse events in daily practice, to produce productive, safe and knowledgeable nurses that can provide good practice, good services and increase practicing of safe patient care in clinical practice, and to be more active in continuing nursing education program for nurses particularly on the program that related to patient outcomes, leadership style, communication skills, teamwork and collaboration or patient safety can be established.

CONCLUSION

This study concludes that NPEs in teaching hospitals are unfavorable where nurses' practice environment inadequate involvement among nurses in hospital affairs, inability and ineffectiveness of nurse managers, less support and motivation from nurse managers, insufficient staffing, resources and time to accomplish care as well as inadequate nurse-physician relations. In terms of POs, there was a low level of patient falls and medications errors, whereas a moderate level of nosocomial infections and patient complaints. In keeping with previous studies, there was a significant association found between overall NPEs and patient complaints, collegial nurse-physician relations with patient complaints and nurse manager ability, leadership and support of nurses with patient falls. NPEs need to be given more serious consideration and proper intervention. Positive or healthy NPEs which include characteristics of magnet hospital should be introduced in the nurses' practice environment to improve the environment and produce positive outcomes in hospital settings.

REFERENCES

Aiken, LH, Clarke, SP, Sloane, DM, Lake, ET & Cheney, T 2008, 'Effects of hospital care environment on patient mortality and nurse outcomes', J Nurs Adm., vol. 38, no. 5, pp. 223-229.

Aiken, LH, Clarke, SP, Sloane, DM, Sochalski, JA, Busse, R, Clarke, H, Giovannetti, P, Hunt, J, Rafferty, AM & Shamian, J 2001, 'Nurses' reports on hospital care in five countries', Health Affairs, vol. 20, no. 3, pp. 43 – 53.

Baker, GR, Norton, PG & Flintoft, V 2004, 'The Canadian adverse events study: the incidence of adverse events among hospital patients in Canada', Can Med Assoc J., vol. 17, pp. 1678 – 1686.

Chiang, H-Y & Lin, S-Y 2008, 'Psychometric testing of the Chinese version of nursing practice environment scale', Journal of Clinical Nursing, vol. 18, pp. 919 – 929.

'Danny, MN' 2003, Developed and developing country, viewed 16 March 2011, http://www.scalloway.org.uk/popu6.htm.

Department of Health 2000, An organization with a memory: the report of an expert group on earning from adverse events, The Stationery Office, London.

'Department of Health' 2004, Standards for better health, viewed 16 June 2010, http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4086665.

'Department of statistic and economic planning unit' 2010, Malaysian population chat and statistic, viewed 16 July 2010, http://www.malaxi.com/population_size_age_structure2001_2010.htm.

Emilia, ZA & Noor Hasim, I 2007, 'Work-related stress and coping: a survey on medical and surgical nurses in a Malaysian teaching hospital', Jabatan Kesihatan Masyarakat, vol. 13, pp. 55-66.

Friese, CR, Lake, ET, Aiken, LH, Jeffrey, H, Silber, JH & Sochalski, J 2008, 'Hospital nurse practice environments on outcomes of surgical oncology patients', H. Serv Res., vol. 43, no. 4, pp. 1145 – 1163.

Houser, J 2003, 'A model for evaluating the context of nursing care delivery', Journal of Nursing Administration, vol. 33, no. 1, pp. 39 – 47.

Huycke, L & All, AC 2000, 'Quality in health care and ethical principles', Journal of Advanced Nursing, vol. 32, no. 3, pp. 562 – 571.

Kanai-Pak, M, Aiken, LH, Sloane, DM & Poghosyan, L 2008, 'Poor work environments and nurse inexperience are associated with burnout, job dissatisfaction and quality deficits in Japanese hospital', Journal of Clinical Nursing, vol. 17, pp. 3324 – 3329.

Lake, ET 2002, 'Development of the practice environment scale of the nursing work index', Res Nurs Health, vol. 25, no. 3, pp. 176 – 188.

Laschinger, HKS, Finegan, J, Shamian, J & Casier, S 2000, 'Organizational trust and empowerment in restructured healthcare settings: effects on staff nurse commitment', Journal of Nurs Adm, vol. 30, no. 9, pp. 413 – 425.

Laschinger, HKS & Leiter, MP 2006, 'The impact of nursing work environments on patient safety outcomes: the mediating role of burnout/ engagement', Journal of Nursing Administration, vol. 36, no. 5, pp. 259 – 267.

Lucero, RJ, Lake, ET & Aiken, LH 2009, 'Variations in nursing care quality across hospitals', Journal of Advanced Nursing, vol. 65, no. 11, pp. 2299 – 2310.

Lucero, RJ, Lake, ET & Aiken, LH 2010, 'Nursing care quality and adverse events in US hospitals', Journal of Clinical Nursing, vol. 19, pp. 2185 – 2195.

Mitchell, PH, Ferketich, S & Jennings, BM (American Academy of Nursing Expert Panel on Quality Health Care 1998), 'Quality health outcomes model', J. of Nursing Scholarship, vol. 30, no. 1, pp. 43 – 46.

Manojlovich, M & DeCicco, B 2007, 'Healthy work environments, nurse-physician communication, and patients' outcomes', AJOCC, vol. 16, no. 6, pp. 536 – 543.

Needleman, J, Buerhaus, P, Mattke, S, Stewart, M & Zelevinsky, K 2001, Nurse-staffing levels and patient outcomes in hospitals, Harvard School of Public Health, Boston.

Needleman, J, Buerhaus, P, Mattke, S, Stewart, M & Zelevinsky, K 2002, 'Nurse-staffing levels and the quality of care in hospitals', New England Journal of Medicine, vol. 346, pp. 1715 – 1722.

New Straits Times 2010, 'Warning on patient safety', 16 March, p. 23.

Pekkarinen, L, Sinervo, T, Elovainio, M, Noro, A & Finne-Soveri, H 2008, 'Drug use and pressure ulcers in long-term care units: do nurse time pressure and unfair management increase the prevalence?', Journal of Clinical Nursing, vo. 17, pp. 3067–3073.

Rokiah, M 1994, 'Prevalens tekanan and penyebab tekanan kerja di kalangan jururawat terlatih Hospital Kuala Lumpur', Dissertation, Universiti Kebangsaan Malaysia.

Roche, MA & Duffield, CM 2010, 'A comparison of the nursing practice environment in mental health and medical-surgical settings', Journal of Nursing Scholarship, vol. 42, no. 2, pp. 195 – 206.

Smith, LW & Giuliano, KK 2010, 'Rapid response teams: improve patient safety and patient outcomes', Journal of Advanced Critical Care, vol. 21, no. 2, pp. 126 – 129.

Sochalski, J 2001, 'Quality of care, nurse staffing, and patient outcomes', Policy, Politics, and Nursing Practice, vol. 2, no. 1, pp. 9 – 18.

Stone, PW, Mooney-Kane, C, Larson, EL, Horan, T, Glance, LG & Zwanziger, J 2007, 'Nurse working conditions and patient safety outcomes', Medical Care, vol. 45, no. 6, pp. 571 – 578.

Thornlow, D 2005, 'Relationship of patient safety to patient outcomes: analysis of HCUPnet patient safety indicators', Journal of Academy Health, vol. 22, p. 3953.

Thungjaroenkul, P, Kunaviktikul, W, Jacobs, P, Cummings, GG & Akkadechanunt, T 2008, 'Nurse staffing and cost of care in adult intensive care units in a university hospital in Thailand', Nursing and Health Sciences, vol. 10, pp. 31 – 36.

Unruh, L 2003, 'Licensed nurse staffing and adverse events in hospitals', Medical Care, vol. 41, no. 1, pp. 142 – 152.

Wong, CA & Cummings, GG 2007, 'The relationship between nursing leadership and patient outcomes: a systematic review', Journal of Nursing Management, vol. 15, pp. 508 – 521.

World Health Organization (WHO) 2008, Summary of the evidence on patient safety: implications for research, WHO, Geneva, Switzerland.

World Health Organization (WHO) 2009, The world health report 2009-health system: improving performance, World Health Organization, Geneva.

Yen, M & Lo, L-H 2004, 'A model for testing the relationship of nursing care and patient outcomes', Nursing Economic, vol. 22, no. 2, pp. 75 – 80.