Demand for nursing competencies: an exploratory study in Taiwan's hospital system

HUEY-MING TZENG PhD, RN

Associate Professor, Department of Nursing, I-Shou University, Kaohsiung County, Taiwan

SHAKÉ KETEFIAN EdD, RN

Professor and Director of Office of International Affairs, School of Nursing, The University of Michigan, Ann Arbor, MI, USA

Summary

• Along with increasing complexity of nursing services, hospital employers are demanding qualified and competent staff nurses for high quality clinical care. In Taiwan, disparities in the demand for competent nurses by employers and the supply produced by nursing educators still exist and require attention. A comprehensive understanding of the specific needs of Taiwan's medical care system for nursing services would help bridge the current gap between demand for and supply of competently trained nurses.

• This exploratory study investigated hospital employers' perceptions of the extent to which the nursing skills identified by Cleary *et al.* [Image: Journal of Nursing Scholarship (1998)**20**(4):39–42] were needed for staff nurses in Taiwan's medical care system. There were a total of 21 nursing competencies and classification on these items was also implemented.

• A cross-sectional, quantitative, survey design was conducted. Subjects' participation was voluntary, an information leaflet and an informed consent form was included in the questionnaire. A total of 89 nursing employers (nursing directors, associate directors, supervisor, or head nurse) participated, resulting in a 42.6% response rate.

• Factor analysis grouped these skills into three factors: basic-level patient care, intermediate-level patient care and basic management, and advanced-level patient care and supervision. This study confirmed that levels of nursing competencies needed differed by type of hospital accreditation. These levels also varied depending on types of services provided, employers' professional titles and tenure of currently employed nurses.

• The questionnaire developed for this study could be used as one of the tools to communicate demand and supply of nursing competencies between nurse

Correspondence to: Huey-Ming Tzeng, Department of Nursing, I-Shou University, Number 1, Section 1, Hsueh-Fu Road, Ta-Hsu Hsiang, Kaohsiung County, Taiwan 840 (tel.: +886-926150912; e-mail: tzeng_hueyming@yahoo.com).

educators and employers. These competencies could be used to develop a checklist for evaluating adequacy of nursing programmes in order to meet nurses' new roles and responsibilities and improve nursing care quality in the fast-changing health care environment in Taiwan.

Keywords: demand, hospital, management skills, nursing competency, patient care skills, staff nurse.

Introduction

Along with increasing complexity of nursing services, hospital employers are demanding qualified and competent staff nurses for high quality clinical care. Moreover, nursing education tends not to reflect such rapid changes in teaching curricula, which has resulted in new graduates having coping difficulties, high turnover rates for new staff, additional costs in human resource management and on-job training and diminished quality of nursing care (Western, 1994). Moreover, Zhang *et al.* (2001) delineated the importance of studying nursing core competencies, as these would contribute to effective performance. In Taiwan, disparities in demand for competent nurses by employers and the supply produced by nursing educators still exist (Chen *et al.*, 1998). Cleary *et al.* (1998) studied the market for nursing personnel in North Carolina and suggested that workforce planning should not only involve appropriate nursing competencies, but that employers should also identify the preferred skills they want their future nurses to bring to their hospitals. A search for similar research in Taiwan found that no such studies had been conducted there in the past 5 years. As a result, a preliminary investigation prior to a formal study was carried out to increase understanding of Taiwan's health care system.

The purpose of this exploratory study therefore was to investigate hospital employers' perceptions of the extent to which the nursing skills identified by Cleary *et al.* (1998) were needed for staff nurses in Taiwan's medical care system. A comprehensive understanding of the specific needs of Taiwan's medical care system for nursing services would help bridge the current gap between demand for and supply of competently trained nurses. In this study, both 'need' and 'demand' represent levels of services required to generate optimal nurse-sensitive patient outcomes.

Literature review

Watson *et al.* (2002) conducted a literature review using systematic methods to examine clinical competence in nursing. Despite a wealth of related studies, most of the methods in use to measure competence have not been developed systematically and there was considerable confusion about the definition of clinical competence. Competence, competency and competencies have been used in the literature to describe various clinical or business skills as related to nurses' performance, including quality of care and productivity (Sinclair & Gardner, 1999; Watkins, 2000; Zhang *et al.*, 2001; Griffith *et al.*, 2002; Watson *et al.*, 2002).

Nursing competence is defined as personal skills developed through professional nurse training courses and is considered to be an outcome of these courses. Competencies, which might change along with environmental changes, comprise a group of broad abilities and practical skills. Competence is thus considered an individual characteristic (DeBack & Mentkowski, 1986; Archibald & Bainbridge, 1994). Past studies have often classified nursing skills into the following dimensions: patient care/nursing process, interpersonal relationships, teamwork, communication, planning and evaluation, teaching and coordination, professional development, research and management/leadership (Schwirian, 1978; Buckenham, 1988; Yu & Ma, 1992 Chen *et al.*, 1993; Hsu *et al.*, 1994; Ellis & Hartley, 1995; Lu *et al.*, 1998; Pai *et al.*, 1999). In Larsson & Butterfield's (2002) study of environmental health and nursing, competencies focused on four aspects: knowledge and concepts, assessment and referral, advocacy, ethics and risk communication, and legislation and regulation. In addition, Jeffreys (2002) emphasized, for clinical nurse specialist education, the importance of developing skills to provide quality care to culturally diverse clients and to collaborate with multicultural workforce. In hospitals, professional standards serve as the infrastructure underpinning the development of institutional standards of patient care, competency-based education courses and quality assurance programmes in integrated health care delivery systems (Dozier, 1998). In Taiwan, professional standards have been well developed and since 1982 the competency-based nursing clinical ladder system has been implemented in more than 100 hospitals. Hospitals usually implement a

four-level nursing clinical ladder system: N1 (entry level; to perform general patient care); N2 (to participate in critical patient care); N3 (to execute integrated nursing care and be responsible for clinical teaching activities); and N4 (to function as nursing administrator and assist in research/survey activities) (Pai *et al.*, 1999; Kaohsiung Veterans General Hospital, 2000).

Brzytwa *et al.* (2000) indicated that the USA nursing profession currently faces two educational challenges. The first is to educate the current nurse workforce, which has limited grounding in the health care system (e.g. health policy and economics). The second is to prepare future practitioners for collaborative and increasingly community-based, population-focused practice. Hagerty (1992) suggested that liberal nursing education should emphasize the following types of knowledge: professional knowledge, professional skills, implementation of the nursing process, contextual practice, analytical practice, aesthetic practice, leadership and professional development. Several studies have indicated that orientation of nursing education has shifted from an information-driven environment to a process of teaching critical thinking and clinical judgement skills as a basic component of professional nursing practice (Bechtel *et al.*, 1999; Boblin-Cummings *et al.*, 1999; Thompson & Rebeschi, 1999; Angel *et al.*, 2000; Tan, 2000).

Interpersonal skills/emotional intelligence, interprofessional (medicine and nursing) communication, cultural competency and integrating skills in the context of holistic patient care have been valued and listed as priorities in nursing performance improvement (Carberry, 1998; Freeth & Nicol, 1998; Muller-Smith, 1999, Salimbene, 1999). Cleary *et al.* (1998) identified 21 skills that employers needed in hospital nursing personnel and found that those in North Carolina expressed an urgent demand for their future nursing labour force to have competencies in critical thinking, leadership, flexibility and resource management. Brzytwa *et al.* (2000) examined nurse employers' and educators' perceptions of deficiencies and the importance of enhancing nursing education related to specific managed care competencies. Both employers and educators perceived practice-of-nursing competencies as being the most important and least deficient, and business-of-nursing competencies as being the most deficient and least important for enhancing nursing education.

In the USA, Diede *et al.* (2000) concluded that the two highest-ranked competencies for the performance of associate degree-prepared nurses during the first 6 months following graduation were effective oral and written communication and personal attributes such as flexibility and open-mindedness; areas that needed to be improved

were communication skills and professional accountability. The Pai *et al.* (1999) study, in a Taiwan medical centre, reported that staff nurses rated their areas of greatest competency as patient care, followed by overall nursing care, communication, teaching, management, self and professional growth and research skills.

In summary, these studies demonstrate that health care employers demand both practice and business of nursing competencies, yet these have seldom been investigated in depth. In addition, it is possible to categorize different nursing competencies into more than one skill area. For example, assessment skills could be categorized as either nursing care or research skills.

We decided to use Cleary *et al.*'s (1998) research findings, along with our professional experience, as the basis for delineating the nursing competencies needed and developing a survey questionnaire. These competencies should be self-explanatory and include the core components cited in the literature reviewed above. In other words, this study focused on analysing nursing competencies, and the typology of these competencies would be determined by using factor analyses. Past studies also have demonstrated that nursing competency is related to age, education, working years, job position, marital status, number of children and motivation (Ashworth & Morrison, 1991; Selvey *et al.*, 1991, Yu & Ma, 1992; Kreider & Barry, 1993; Pai *et al.*, 1999).

The study

RESEARCH QUESTION

This exploratory study investigated the extent to which hospital employers in Taiwan needed the nursing competencies for staff nurses identified by Cleary *et al.* (1998). The hospital was the unit of analysis. The main research question was: to what extent do hospital employers in Taiwan desire the 21 identified nursing competencies for staff nurses? For scale reduction, factor analysis was used to classify the skills included in this study. Comparison of the variable mean values across different hospital accreditations was also performed.

DEFINITIONS

Staff nurse refers to nurses who have graduated from an accredited, official nursing programme and held a professional license as a Registered Nurse or Practical Nurse. In Taiwan, there is no difference in the responsibilities of Registered and Practical Nurses; their main responsibility is to provide direct clinical patient care. When recruiting

nurses, administrators usually take professional experience, educational background and licensure into consideration. In most Taiwanese hospitals, tenure and licensure (Registered Nurse vs. Practical Nurse) matter most to staff nurses' salary grade.

Nursing employers are administrators who manage human resources-related issues in nursing staff, including (ranked from high to low) directors, associate directors, supervisors, head nurses and assistant head nurses.

THE INSTRUMENT

After several informal conversations with Taiwanese nursing leaders (from governmental, academic and clinical organizations), we decided to use Cleary et al.'s (1998) research findings as the basis for delineating the nursing competencies needed to develop the survey questionnaire. These competencies are self-explanatory and include the core components cited in the past literature reviewed above. Nursing competencies (also called core competencies) (21) included in the study are based on the research of Cleary et al. (1998), previously reviewed literature and preliminary research findings. These skills are: general professional technical skills, complex professional technical skills, general clinical skills, specific clinical skills, long-term care/geriatric skills, multiple skills, assessment skills, ability to work independently, critical thinking/problem solving, written/verbal communication, interpersonal communication, professional orientation, case management, ability to supervise, resource management, team building/team work, leadership, delegation, flexibility, health care systems knowledge and coping/self adjustment ability. Employers were asked to respond to these competency items in terms of the extent to which staff nurses need to be equipped for providing quality direct nursing care (measured on a five-point Likert scale, with $5 =$ most needed, $4 =$ needed, $3 =$ neutral, $2 =$ not needed and $1 =$ least needed). All these items were operationalized in the Questionnaire for Surveying Nurse Work Force and Desired Nursing Competencies.

PRELIMINARY STUDY

Our preliminary study was conducted between April and May 2000. The Human Subject Review Committee of I-Shou University reviewed the proposal of this preliminary study for approval and assuring human subject protection. Participation was voluntary and an information leaflet was included in the first section of the questionnaire.

The preliminary work was performed to identify specific nursing skills needed by employers for hospital staff nurses. Our pilot study subjects were nursing administrators from 10 hospitals in southern Taiwan (a convenience sample). Based predominantly on Cleary et al.'s (1998) study of the nursing personnel market in the United States, a structured, self-administered questionnaire was developed. With the exception of demographic information, survey items were constructed as a Yes/No dichotomous scale. Content validity and jury opinion (23 nursing administrators or staff nurses from these 10 hospitals) were used to verify the appropriateness of the questionnaire for wording, content, structure and cultural context in an open discussion group. The Mandarin wording (corresponding to English terms) of this pilot questionnaire was modified based on these collected comments. Questionnaires were distributed and retrieved by research assistants after a training session.

Descriptive analyses demonstrated that the most highly needed competencies were general professional technical skills, assessment skills, ability to work independently, critical thinking, interpersonal communication, professional orientation, case management and team building. Both practice- and business-orientated nursing competencies were emphasized. One nurse administrator suggested adding self-coping skills to the list of needed nursing competencies. To capture the variance across different institutions better, we replaced the dichotomous scale by a five-point Likert scale to measure the needed levels of different nursing competencies.

MAIN STUDY

The formal study used a cross-sectional research design and quantitative/survey approach. Data were collected once per subject during May–July 2001. The Human Subject Review Committee of I-Shou University also reviewed the proposal of this project for approval and assuring human subject protection. Subjects' participation was voluntary, an information leaflet was included and their informed consent was obtained as before.

Subjects

The population included all of the hospitals (a total of 216) accredited for the year 2000 by the Taiwan Joint Commission on Hospital Accreditation as a medical centre, regional hospital, local teaching hospital, local non-teaching hospital or speciality hospital. Questionnaire packages were sent for the attention of the hospital nursing director and included a preaddressed and stamped return envelope. One month later, in order to increase the response rate, a follow-up letter was sent to those who had

Table 1 Demographic characteristics

Variable	Frequency	Per cent
Type of hospital		
Medical centre	6	6.7
Regional hospital	19	21.4
Local teaching hospital	19	21.4
Local non-teaching hospital	36	40.4
Speciality hospital	9	10.1
Type of funding		
Public/civil	12	13.5
Military	6	6.7
University	3	3.4
Not-for-profit/charitable	18	20.2
Private	47	52.8
Unanswered	3	3.4
Services provided (marked; some subjects left this session blank)		
Outpatient service	84	
Inpatient service	83	
Chronic inpatient/non-psychiatric service	23	
Chronic inpatient/psychiatric service	23	
Nursing home service	30	
Day care/hospital	28	
Postpartum service	7	
Home care service	47	
Correspondent's title		
Nursing director	58	65.2
Associate director	2	2.2
Supervisor	12	13.5
Ward head nurse	11	12.4
Unanswered	6	6.7
Correspondents' educational background (completed degree)		
Occupational high school	3	3.4
Junior college	32	36.0
Four-year university	30	33.6
Graduate school	16	18.0
Unanswered	8	9.0

not responded. The overall response rate was 42.6% ($n = 89$; 92 returned questionnaires, three invalid). There were 212 staff nurses on average per hospital ($n = 88$, SD = 349.84) and the average number of staff nurses by different hospital accreditations were: medical centres = 1254, regional hospitals = 369, local teaching hospitals = 132, local non-teaching hospitals = 38 and speciality hospitals = 46. There were 4.77 nurse specialists per hospital on average ($n = 88$, SD = 10.86). Additional demographic information is shown in Table 1.

Measurement instrument

The final version of the Questionnaire for Surveying Nurse Work Force and Desired Nursing Competencies contained a hospital demographic sheet, nurse personnel information form, needed levels of nurse competency items (21 items), general satisfaction indicators with nursing competencies of currently employed staff nurses (seven items) and skill areas that needed to be improved for currently employed staff nurses (six items). Needed nursing competency items were rated on a five-point Likert scale. Based on the findings of the preliminary study, further tests of content validity and jury opinion were performed with two nursing administrators and one educator. The final version of the questionnaire was carefully evaluated again and a few item wordings were modified based on their comments.

Analyses

Data were entered and processed using Microsoft Excel 2000 and SPSS 8.0 (SPSS Inc., Chicago, IL, USA) statistics software. Descriptive analyses, factor analysis (described below), Pearson and Spearman's rho correlation analyses were used. It was noted that all absolute values of skewness and kurtosis were <2 and as a result the variables were treated as continuous indicators. As this study had an exploratory research design, one-way ANOVA was performed to investigate any difference among five different hospital accreditations (medical centre, regional hospital, local teaching hospital, local non-teaching hospital and speciality hospital). Independent t-tests for equality of means were used to explore any difference between hospitals that provided a certain type of services and those that did not provide those services (including chronic non-psychiatric and chronic psychiatric inpatient services, nursing homes and home care).

Factor analysis was used to determine how these skills were grouped ($n = 89$). The three-factor solution was chosen as the best solution according to the Scree plot and eigenvalues (initial eigenvalues: total = 1.57, percentage of variance = 7.49, cumulative percentage = 54.78). The extraction method was Principal Component Analysis; Varimax rotation with Kaiser normalization was also employed.

Results

As shown in Fig. 1, the first factor included seven basic-level patient care skill items, the second factor was composed of nine intermediate-level patient care or basic management skills and the third factor was composed of five advanced-level patient care or supervision skills. The Cronbach's alpha coefficients for each factor were: factor 1 (alpha = 0.881, standardized item alpha = 0.883, $n = 88$, seven items); factor 2 (alpha = 0.854, standardized item
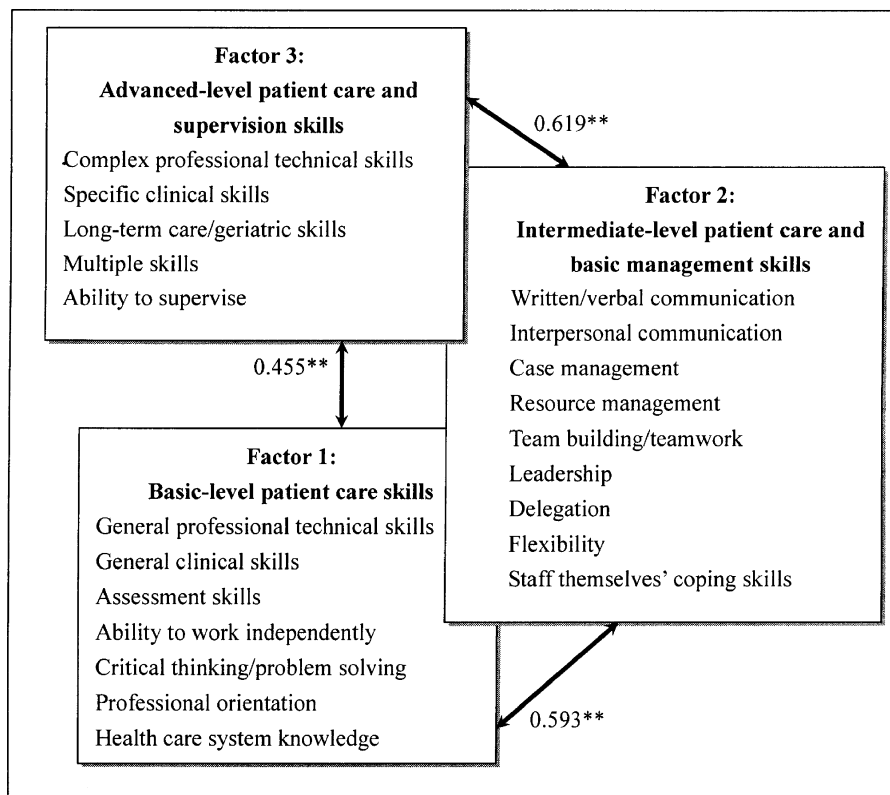
Figure 1 The three-factor framework of nursing competencies needed as perceived by hospital employers in Taiwan. Pearson correlation coefficients among three factors are shown alongside the arrows.

Note: *P ≤ 0.05; **P ≤ 0.01.

alpha = 0.854, *n* = 86, nine items); factor 3 (alpha = 0.768, standardized item alpha = 0.779, *n* = 81, five items). All of the loadings were above 0.506 (from the rotated matrix). The Cronbach's alpha coefficient for all 21 nursing competency items together was 0.891 (*n* = 80, 21 items). Pearson correlation coefficients among these three factors were all statistically significant and are indicated in Fig. 1.

Descriptive information, including 95% confidence intervals for means, is provided in Table 2. In comparison with the levels of three identified competency factors across different types of hospitals, medical centres had the highest level of demand for all three-competency factors. Table 3 gives Spearman's rho correlation coefficients between demographic characteristics and competency factors. Results demonstrated that if participants' job titles (professional position) were higher, they would have higher levels of demand for competency factor 3. If a hospital's nurse tenure were longer in years, the employer would have higher demand for competency factor 3.

Results of one-way ANOVA demonstrated that staff nurses' educational background (in percentages) was significantly different for different hospital accreditations. Complex professional technical skills, assessment skills,

written/verbal communication, case management, ability to supervise, resource management, leadership, competency factor 1 and competency factor 2 were found to be significantly different across five types of hospital accreditations. Results of independent *t*-tests (equal variances assumed on providing vs. not providing certain kinds of services) found that employers from hospitals which provided chronic psychiatric inpatient services had significantly higher levels of demand for competencies of written/reading communication (mean difference = 0.33), case management (mean difference = 0.50), ability to supervise (mean difference = 0.36), resource management (mean difference = 0.35), leadership (mean difference = 0.44), delegation (mean difference = 0.40) and the composite score of competency factor 2 (mean difference = 0.29). Hospitals that provided nursing home services had significantly higher levels of demand for staff nurses' competencies in assessment skills (mean difference = 0.23) and written/reading communication (mean difference = 0.28). Hospitals that provided home care services indicated significantly higher demand for staff nurses' competencies of complex professional technical skills (mean difference = 0.29) and assessment skills (mean difference = 0.21). The alpha value for these tests was set at 0.05.

Table 2 Nursing competency items and scales

Variable Type of hospital	N (valid)	Mean	SD	95% CI*	Rank[1]
Competency factor 1					
Medical centre	6	5.00	0.00	–	1
Regional hospital	19	4.70	0.30	4.55/4.84	1
Local teaching hospital	19	4.71	0.32	4.56/4.87	1
Local non-teaching hospital	36	4.60	0.46	4.44/4.75	1
Speciality hospital	9	4.52	0.48	4.15/4.90	1
All subjects	89	4.66	0.40	4.58/4.75	1
Competency factor 2					
Medical centre	6	4.81	0.23	4.57/5.06	2
Regional hospital	19	4.24	0.46	4.02/4.46	2
Local teaching hospital	19	4.42	0.29	4.27/4.56	2
Local non-teaching hospital	36	4.20	0.40	4.07/4.33	2
Speciality hospital	9	4.51	0.31	4.27/4.74	2
All subjects	89	4.33	0.41	4.24/4.41	2
Competency factor 3					
Medical centre	6	4.70	0.33	4.36/5.04	3
Regional hospital	19	4.11	0.46	3.89/4.33	3
Local teaching hospital	19	4.19	0.34	4.02/4.35	3
Local non-teaching hospital	36	3.92	0.52	3.75/4.10	3
Speciality hospital	9	4.13	0.48	3.76/4.50	3
All subjects	89	4.09	0.49	3.99/4.20	3
Competency 1: General professional technical skill					
All subjects	89	4.72	0.52	4.68/4.87	1
Competency 2: Complex professional technical skill					
All subjects	87	4.08	0.65	3.93/4.22	16
Competency 3: General clinical skills					
All subjects	89	4.66	0.54	4.62/4.83	6
Competency 4: Specific clinical skills					
All subjects	88	4.07	0.58	3.96/4.22	17
Competency 5: Long-term care/geriatric skills					
All subjects	86	4.07	0.84	3.89/4.26	17
Competency 6: Multiple skills					
All subjects	85	4.24	0.65	4.12/4.40	13
Competency 7: Assessment skills					
All subjects	88	4.70	0.48	4.63/4.82	3
Competency 8: Ability to work independently					
All subjects	89	4.71	0.48	4.64/4.84	2
Competency 9: Critical thinking and problem solving					
All subjects	88	4.57	0.56	4.50/4.73	9
Competency 10: Writing and verbal communication					
All subjects	89	4.42	0.62	4.29/4.56	11
Competency 11: Interpersonal communication					
All subjects	89	4.70	0.53	4.66/4.86	3
Competency 12: Professional orientation					
All subjects	89	4.70	0.51	4.64/4.84	3
Competency 13: Case management					
All subjects	89	4.24	0.60	4.12/4.38	13
Competency 14: Ability to supervise					
All subjects	88	4.03	0.60	3.91/4.17	19
Competency 15: Resource management					
All subjects	88	4.09	0.64	4.00/4.27	15
Competency 16: Team building and teamwork					
All subjects	88	4.60	0.56	4.55/4.77	8

Variable Type of hospital	N (valid)	Mean	SD	95% CI*	Rank[1]
Competency 17: Leadership					
All subjects	88	3.97	0.58	3.84/4.09	20
Competency 18: Delegation					
All subjects	88	3.97	0.63	3.84/4.11	20
Competency 19: Flexibility					
All subjects	88	4.33	0.54	4.23/4.47	12
Competency 20: Health system knowledge					
All subjects	89	4.57	0.54	4.48/4.72	9
Competency 21: Self-coping skills					
All subjects	89	4.65	0.50	4.57/4.78	7

*95% CI: 95% confidence interval for mean (lower bound and upper bound).
[1]Rank: Rankings of mean values were ordered from high to low for all subjects (for 21 competency items), and in each hospital type (only for three competency factors).

Table 3 Spearman's rho correlation coefficients between demographic characteristics and nursing competency scales ($n = 89$)

Variable\r	Employers		Nurse employees	
	Title[1]	Education background[2]	Age[3]	Tenure[4]
Competency factors				
Competency factor 1	−0.17	0.02	−0.04	−0.08
Competency factor 2	−0.17	−0.01	0.06	0.12
Competency factor 3	−0.34**	0.13	0.12	0.25*

*$P < 0.05$, **$P < 0.01$.
[1]Employers' title (1 = nursing director; 2 = associate director of nursing; 3 = supervisor; 4 = head nurse).
[2]Employers' educational background (1 = occupational high school diploma; 2 = junior college diploma; 3 = bachelor degree; 4 = masters degree or higher).
[3]Nurse employees' average age (years).
[4]Nurse employee.

Discussion and conclusions

The findings of this study demonstrated that hospital employers in Taiwan needed all 21 identified nursing competencies for staff nurses. However, the rankings of the needed nursing competencies in this study (mean values) differed from those reported by Cleary *et al.* (1998). The 10 nursing competencies in the present study (see Table 2 for included items and scales) that were found to be most needed, ranked from high to low mean values, were general professional technical skills, ability to work independently, interpersonal communication, professional orientation, assessment skills, general clinical skills, self-coping skills, team building and teamwork, health system knowledge and critical thinking. In Cleary *et al.*'s (1998) study, the 10 most frequently needed skills, from higher to lower frequency,

were specific clinical skills, assessment skills, technical skills, resource management, interpersonal communication, general clinical skills, complex technical skills, critical thinking and long-term care/geriatric skills, followed by written/verbal communication and ability to supervise, which had the same frequency.

In the US, nursing care has become increasingly specialized (e.g. hiring clinical specialists for wound care or pain management). As a result, in contrast to the present study that found that health care managers placed more emphasis on basic clinical skills, the US study found that health care managers had a greater demand for complex and specific clinical skills. In Taiwan, although the national government passed regulations accrediting nursing specialists in 2000, these are not widely used in the health care system. Moreover, in the US, where patients' family members seldom participate in nursing care, hospitals hire lower-cost personnel such as nursing aides to share part of Licensed Nurses' responsibilities. To use these auxiliary personnel best, staff nurses' managerial skills become crucial in providing efficient and cost-effective services. In contrast, in Taiwan, patients' family members usually share some of nurses' responsibilities during hospitalization, such as morning care and bed bathing, and they might also hire a nursing aide for private duty bedside care. Except for long-term care units, hospitals generally do not use auxiliary personnel to decrease staff nurses' workload. These differences in ways of providing patient care could explain some of the incomparability between the results of the present study and those of Cleary *et al.* (1998).

Our results confirmed that levels of nursing competencies needed differed by type of hospital accreditation. They also varied depending on the types of services provided, employers' professional titles and tenure of

currently employed nurses. Future studies on demand for specific nursing skills should consider these health care system and demographic characteristics.

The four-level clinical ladder system, a hierarchy of nursing skills that has been widely adopted in Taiwan, was designed using a microapproach in an institution. The present study, however, took a macro-level approach to estimate the demand of the health care system as a whole. Figure 1 shows a structure that can be used for planning nursing educational programmes for the current and future nurse workforce.

The questionnaire developed for this study could be used as one of the tools to communicate the demand and supply of nursing competencies between nurse educators and employers. These competencies could also be used to develop a checklist for evaluating the adequacy of nursing programmes in order to meet nurses' new roles and responsibilities and raise nursing care quality in a fast-changing health care environment in Taiwan. Detailed definitions for each nursing competency should be developed through consensus and serve as a common language among nursing leaders and employers and more research is required on this subject. Collaboration between nurse educators and employers (such as holding conferences) should be encouraged for purposes of continuously improving the quality and abilities of nurses as well as enhancing the quality of nursing care.

LIMITATIONS AND RECOMMENDATIONS
FOR FUTURE RESEARCH

The first major limitation is the low response rate of 42.6%, which limits the generalizability of the findings. Subsequent empirical work should focus on increasing response rates and thus decreasing self-selection bias. The second limitation is our cross-sectional research design. Similar issues could be explored through the use of longitudinal or time-series designs to understand better possible interactions between demand and supply for these competencies in the nursing market. A qualitative approach could be used to understand more deeply employers' perceptions of the nursing competencies needed. In addition, this study was solely conducted in Taiwan and caution is needed when generalizing the results to other countries.

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