Journal of Problem-Based Learning
Vol.2, No.1, January, 2015

A Study of ICU Nursing Core Skill Design for Nursing Practice Education and Nursing Students' Performance Competency

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ABSTRACT

Objectives: The purpose of this study was to provide fundamental information for the establishment of ICU Nursing Core Skill for nursing students of Cheju Halla University, South Korea by clarifying contemporary nursing skills/activities used in an ICU.

Methods: A cross-sectional survey was conducted using a Nursing Activities Questionnaire that included 99 questions in a 4-Likert scale. Data were collected from 111 nurses working in ICUs within 6 different hospitals in Jeju and 168 3rd year students who were enrolled in the ICU core skills course with a response rate of 78.87%. The Important Index was calculated from the urgency multiplied by four and added frequency of nursing activities (The Important Index = the urgency×4 + frequency). The data was analysed with SPSS 20.0 program using descriptive statistics for frequency, urgency, importance and performance competency of nursing activities.

Results: Fifty nursing activities that had ranked upper 25 % of the Important Index score among 99 nursing activities were examined. When 14 ICU Nursing Skills used at the Cheju Halla University were matched with 50 nursing activities identified by the ICU RNs, upper 25% of the Importance Index score, 9 items were found to be consistent.

Conclusions: This research showed the frequency of relevant nursing interventions ranked within an Importance Index, and the focus of performance competency elements of nursing activities in ICU of hospitals in Jeju Island. Based on the results of this study, there is need to correct and revise ICU Core Skill elements within programs at Cheju Halla University. Future study is suggested to examine and evaluate the ability of nursing students who perform nursing activities shown as relevant and critical on the Importance Index in this study.

Keywords: Critical care, Core Skill, Performance Competency, Nursing Students

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BACKGROUND

Today, a rapidly changing healthcare environment is highly complex and challenging. It is essential for nurses to provide safe and effective care with the latest knowledge and demonstration of technical procedures (Bowles, 2000). In order to cope with rapidly changing critical situations in an Intensive Care Unit (ICU), Registered Nurses (RNs) are required to assess a patient's life-threatening conditions, develop and implement safe and evidence-based interventions in a timely manner (AACN, 2004; Benner, 1992). In Korea, one of the recent issues raised in nursing education is that there is not enough hands-on practice, and inadequate time for repetition of skills learnt during clinical practice placement. Nevertheless, nurse educators strive to facilitate nursing students' competence through appropriate instructional approaches (Yang, 2008).

In order to develop their clinical competence relevant to the ICU context, the School of Nursing at the Cheju Halla University (CHU) in South Korea developed an ICU core skills course within the undergraduate nursing program in 2007 and the course has been implemented since 2008. In development of ICU core skill course, the researchers based a list of 136 interventions of the current national standards (Park, et al., 2000) and the Nursing Intervention Categories (NIC) that reflect contemporary nursing practice. We referred to studies (Kim, et al., 2005; Lee, 2002) that highlighted the role of ICU RNs, and ICU and Emergency Room (ER) nursing skill needs outlined within the 2007 hospital evaluation manual (The Ministry of Health and Welfare, 2007). Identification of the core skills for ICU were also collected from the literature (Lee, 2002; Kim, et. al., 2005; The Ministry of Health and Welfare, 2007) and the results of the survey which examined ICU nurses' perceptions of core skills at hospitals in Jeju city were also included in the course and clinical skills laboratory sessions (Cheju Halla University, 2011). Given the contemporary use of a high-fidelity simulation with complex case scenarios, this provides opportunities for third year students to integrate and apply knowledge, attitudes, and skills that they learnt previously. At the end of the course, an ICU nursing expert is invited and assesses students' clinical performance. Also, their performance is videotaped for the purpose of debriefing and self-reflection. An immediate debrief is used to discuss the case scenario and consolidate learning after watching the video recording to enhance problem-solving skills and core skills required in the ICU.

AIMS

This study was conducted to identify the extent to which the ICU Core Skills derived from clinical skills laboratory sessions were performed in actual clinical practice and to investigate the performance competency of nursing students. The study also intended to demonstrate the level of urgency, frequency, performance competency, and importance index of ICU nursing activities of ICU nurses and nursing students, and to establish the fundamental contemporary data on ICU Nursing Core Skills for the nursing students of CHU.

The following objectives of this study were developed:

1) To investigate the Importance, urgency, frequency, and performance competency of ICU nursing activities in practice,

2) To identify the performance competency of ICU nursing activities among nursing students,

3) To consider the relevance and importance of ICU core skills of CHU and ICU Nursing activities in actual practice.

METHODS

Design

An exploratory survey design was carried out using a questionnaire from the Korean nurse's job description developed by Kim, Song, Kim, and Lee (2004), and a Job analysis tool for ICU nurses used in Lee's research (2002).

Setting and Participants

The study was conducted in the ICU laboratory at the Department of Nursing at the CHU. During the second semester of 2010, a total of 213 3rd year students who enrolled in the ICU core skills course were invited to participate in this study. Also, a convenience sample of 140 ICU RNs in local hospitals in Jeju city was recruited.

Instrument

The study focused on the participants' demographic characteristics and (1) identification of the perceived urgency of ICU nursing activities with respect to preparation for practice, (2) identification of the frequency of ICU nursing activities, (3) assessment of the competency-based performance of ICU nursing activities, and (4) identification of the relative importance of particular skills within an index of ICU nursing activities.

Urgency of ICU Nursing Activities

The urgency of ICU nursing activities highlights the centrality of the activities given the urgency with which they should be carried out in the actual ICU work situation. Each of the nursing activities was rated using a 4-point Likert scale ranging from 1 = nursing activities rarely lead to a threat to the lives of patients when the nursing care is delayed;, 4 = nursing activities which lead to life-threatening situations and to the lives of patients when the nursing care is delayed: The higher the score, the greater the urgency. The internal consistency of the scale was demonstrated by Cronbach's alpha = 0.96 in this study.

Frequency of ICU Nursing Activities

The frequency of ICU nursing activities refers to the frequency of actions performed by the ICU nurse in an actual work situation. The researchers estimated the average number (frequency) of nursing care activities. These ICU nursing activities were then rated using a 5-point Likert scale ranging from 1 = never or hardly ever, 2 = more than once a year, 3 = more than once a month, 4 = more than once a week, 5 = almost every day. The higher the score the more frequently the activities were carried out. The internal consistency of the scale was demonstrated by Cronbach's alpha = 0.99 in this study.

Performance Competency of ICU Nursing Activities

Performance competency of ICU nursing activities referred to the level of competence and independence that an ICU nurse has demonstrated in an actual work situation. It was measured using a 4-point Likert scale ranging from 1 = the supervision of senior needed to perform the nursing activities from start to finish, 2 = I can perform with somebody's help or access to guidelines on knowledge or skill about nursing activities, 3 = I can perform the nursing activities by myself from start to finish without advice or guidelines, 4 = I can advise or educate my colleagues on nursing activities. The higher the score attained, the higher the competence in nursing activities. The internal consistency of the scale was demonstrated by Cronbach's alpha = 0.99 in this study.

Importance Index of ICU Nursing Activities

The Importance Index of ICU nursing activities was calculated on the perceptions about nursing activities rated

with respect to their importance within the functions of the ICU nurse. The Importance Index was calculated using the formula: the urgency multiplied by four and added frequency (4 × urgency + performed frequently) designed by the expert group of the US National Council of State Board of Nursing (Lee, 2002), urgency was deemed to have more official weighting than frequency.

Data Collection

Prior to data collection using the survey, verbal and written information regarding the purpose and the method of the study was provided to the participants, and written approval to conduct the study was obtained from the relevant health and higher education personnel. They were also assured of confidentiality and anonymity, and that they could withdraw from the study at any time without disadvantage. The questionnaire consisted of demographic questions and scales to measure nurses' urgency, frequency, performance competency, and importance index of ICU nursing activities and students' performance competency of ICU nursing activities. The total period for data collection was 15 days in the case of nurses (from 3 to 17 September 2010) and 8 days in the case of nursing students (from 17 to 24 November 2010). A total of 279 participants, including 111 nurses and 168 nursing students completed the questionnaire with a response rate of 78.87% that was considered appropriate for valid decision-making about the findings from the data set.

Data analysis

Statistical analyses were performed using the SPSS 20.0 software. A two-tailed p-value of <0.05 was considered significant. The following report on results using descriptive statistics, included the percentages, means and standard deviations for frequency, urgency, importance and performance competency of nursing activities.

RESULTS

Participants' Characteristics

Of the 111 RNs, 109 were women (98.2 %) with the mean age of 28.07 years. The majority of the RNs were 25-years old. The educational qualifications of the RNs were as follows: Bachelor's degree (29.7 %), three-year Nursing Diploma (68.5%), post-graduate degrees (1.8 %). The majority of them were working as staff nurses (84.7 %). At the time of the study, the average length of ICU work experiences was 38.90 months. Table 1 provides additional detail about the respondents (See Table 1).

Of the 168 3rd year nursing students, 155 were women (92.3%) with the mean age of 21.08 years. The majority of nurses were satisfied with their learning experiences (128 students, 76.2%), and the thought their learning methods were interesting and reflected the most common nursing activities. They rated the most satisfying learning events as clinical practice (66 students, 39.3%), school laboratories (37 students, 22.0%), lectures (26 students, 15.5%), discussions (21 students, 12.5%), and self-directed learning (18 students, 10.7%). Helpful learning methods cited were rated as clinical practice (44.6%), school laboratory (25.6%), lecture (18.5%), discussion (7.1%), self-directed learning (4.2%) (See Table 2).

Urgency, Frequency, Performance Competency, and Importance Index of ICU Nursing activities

Table 3 shows the results of rankings according to urgency, frequency, performance competency, and importance index of ICU nursing activities of ICU nurses.

We examined nursing activities ranked in the upper 25% (above the mean score 15.75) among 99 listed ICU nursing activities. Of the 99 nursing activities, 50 were

relevant and placed within the top 25% on the higher importance index. The highest rating was administering oxygen (mean 19.44), followed by taking ambu bag (mean 19.26), assessing level of consciousness (mean 19.20), taking suction of airway (mean 19.16), preparing and maintaining E-tube (mean 18.96), applying and taking patients off the ventilator (mean 19.05), preparing and maintaining a tracheostomy (mean 18.96), monitoring oxygen saturation (mean 18.95).

Ten nursing activities, the lowest on the importance index, were measurements of the body, caring for patients with a cast, performing the ostomy, caring for patients with applied traction, supporting the dying patients' family members, maintaining and managing the function of urostomy and cystostomy, irrigating the bladder, integrated care, providing muscle relaxation, undertaking simple catheterization. The lowest importance index was measurement of the body.

TABLE 1: General Characteristics (ICU Nurses) *N=111*

Characteristics	Classification	Frequency (%)	Mean±SD
Gender	Male	2(1.8)	
	Female	109(98.2)	
Age (years)	Below 25	43(39.1)	28.07±5.33
	26-30	39(35.5)	
	31-35	18(16.4)	
	36-40	8(7.3)	
	Above	2(1.8)	
Religion	Yes	51(45.9)	
	None	60(54.1)	
Level of Education	Junior college	76(68.5)	
	University	33(29.7)	
	Graduate school	2(1.8)	
Nursing Position	Staff Nurse	94(84.7)	
	Charge Nurse	10(9.0)	
	Head Nurse	7(6.3)	
Length of working at ICU (month)	Below 12 (below 1year)	22(19.8)	38.90±32.69
	13-36 (2-3year)	47(42.3)	
	37-60 (4-5year)	20(18.0)	
	61-84 (6-7year)	9(8.1)	
	85-108 (8-9year)	6(5.4)	
	Above 109 (above 10year)	7(6.3)	
Entire clinical career (month)	Below 12 (below 1year)	9(8.2)	74.21±57.01
	13-36 (2-3year)	27(24.5)	
	37-60 (4-5year)	18(16.4)	
	61-84 (6-7year)	15(13.6)	
	85-108 (8-9year)	18(16.4)	
	Above 109 (above 10year)	23(20.9)	

TABLE 2: Demographic Characteristics 3rd year nursing students *N=168*

Characteristics	Classification	Frequency (%)	Mean±SD
Gender	Male	13(7.7)	
	Female	155(92.3)	
Age (years)	Below 20	39(23.2)	21.08±1.92
	21-22	108(64.3)	
	Above 23	21(12.5)	
Satisfaction of Nursing	None Satisfaction	4(2.4)	
	Not so bad	36(21.4)	
	Satisfaction	128(76.2)	
Interesting Learning Method	Lecture	26(15.5)	
	Discussion	21(12.5)	
	School Lab	37(22.0)	
	Clinical practice	66(39.3)	
	Self Directed Learning	18(10.7)	
Helpful Learning Method	Lecture	31(18.5)	
	Discussion	12(7.1)	
	School Lab	43(25.6)	
	Clinical practice	75(44.6)	
	Self Directed Learning	7(4.2)	
Department of Practice†	General Ward	165(98.2)	
	ICU	156(92.9)	
	OR	140(83.3)	
	ER	136(81.0)	
	DR	82(48.8)	
	AKR	106(63.1)	
	NR	81(48.2)	
	CSR	12(7.1)	
	Psychiatry ward	86(51.2)	
Department of Core Skill Practicum†	Medical ward	154(91.7)	
	Surgical ward	144(85.7)	
	ICU	117(69.6)	
	ER	76(45.2)	
	DR	35(20.8)	
	OR	94(56.0)	
	NR	31(18.5)	

†: Multiple Responses, ICU; Intensive Care Unit, OR; Operation Room, ER; Emergency Room, DR; Delivery Room, AKR; Artificial Kidney Room, NR; Newborn Room, CSR; Central Service Room

TABLE 3: Top 25 Percent Nursing Activities of the higher importance index score of ICU nurse

Rank	Nursing Activities	Importance index	Frequency	Urgency	Competency
1	Administering Oxygen	19.44±2.49	4.92±0.54	3.63±0.60	3.80±0.50
2	Taking Ambu bag	19.26±2.29	4.32±0.83	3.74±0.57	3.67±0.68
3	Assessing Level of Consciousness	19.20±2.85	5.00±0.00	3.55±0.71	3.56±0.67
4	Taking Suction of Airway	19.16±2.68	4.93±0.44	3.56±0.67	3.80±0.47
5	Preparing and maintaining E-tube	19.07±2.05	4.32±0.75	3.85±0.49	3.57±0.84
6	Applying and taking off the ventilator	19.05±2.71	4.20±0.93	3.71±0.57	3.15±0.89
7	Preparing and maintaining tracheostomy	18.96±2.72	4.13±1.05	3.71±0.61	3.49±0.84
8	Monitoring oxygen saturation	18.95±2.91	4.98±0.13	3.49±0.73	3.79±0.43
9	Collecting the emergency specimens	18.72±2.85	4.79±0.54	3.48±0.69	3.40±0.82
10	Assessing respiratory status(Lung sound, Respiratory pattern, etc.)	18.66±2.99	4.96±0.25	3.43±0.74	3.40±0.71
11	Giving Blood	18.49±2.70	4.28±0.72	3.55±0.64	3.65±0.72
12	Confirming emergent medication/equipment	18.22±3.75	4.83±0.48	3.35±0.92	3.44±0.81
13	Performing the ACLS	18.13±3.15	3.41±1.25	3.67±0.67	2.87±1.05
14	Assessing the Function of the Cranial nerve	17.86±3.54	4.58±0.90	3.31±0.80	3.15±0.83
15	Inserting Intravenous cannula	17.86±3.40	4.79±0.56	3.27±0.81	3.64±0.60
16	Checking Vital sign	17.84±3.92	4.97±0.21	3.22±0.97	3.88±0.32
17	Administering Fluid	17.82±3.35	4.95±0.40	3.22±0.81	3.72±0.56
18	Physical assessment of circulating system(including heart sound)	17.68±3.44	4.65±0.87	3.26±0.78	3.12±0.88
19	Performing respiratory care(Deep breathing, Coughing, etc.)	17.56±3.45	4.95±0.40	3.15±0.87	3.78±0.46
20	Preventing Fall	17.49±3.46	4.94±0.41	3.14±0.84	3.64±0.61
21	Preventing self-injury in patients	17.34±3.55	4.57±0.93	3.19±0.87	3.55±0.64
22	Evaluating and recording CPR	17.24±3.98	3.61±0.93	3.40±0.89	3.13±0.93
23	Taking Electrocardiography	17.19±3.47	4.06±1.32	3.26±0.77	3.37±0.94
24	Collecting blood sample	17.14±3.69	4.80±0.66	3.08±0.90	3.62±0.66
25	Reading the Electrocardiography	17.11±3.98	3.62±1.63	3.32±0.83	2.57±0.99
26	Managing Dangers	17.11±3.66	4.82±0.58	3.07±0.89	3.56±0.64
27	Managing Central venous line	16.91±3.60	4.77±0.54	3.04±0.87	3.65±0.63
28	Taking Restriction	16.89±3.45	4.78±0.46	3.03±0.83	3.62±0.63
29	Assessing reflex activity	16.73±3.62	4.45±1.03	3.07±0.80	3.18±0.81
30	Caring related to CVVH	16.72±3.99	3.10±1.40	3.37±0.80	2.69±1.10
31	Assessing and managing ICU related delirium	16.66±3.62	4.59±0.72	3.02±0.83	3.42±0.67
32	Managing the pain	16.65±3.44	4.83±0.50	2.96±0.81	3.50±0.64
33	Assessing difficult defecation and urination	16.57±3.65	4.91±0.35	2.91±0.92	3.58±0.68
34	Checking Blood Sugar	16.55±3.56	4.87±0.49	2.92±0.90	3.79±0.53
35	Applying and weaning of IABP	16.55±3.16	2.04±1.01	3.60±0.71	2.33±0.98
36	Administering oral medication	16.50±3.69	4.97±2.11	2.88±0.92	3.76±0.47
37	Maintaining and Managing EVD	16.50±3.15	3.18±1.30	3.32±0.68	3.09±0.98
38	Assessing the risk factors and symptoms of infection	16.47±3.47	4.73±0.65	2.94±0.80	3.31±0.76
39	Applying nebulizer	16.47±3.28	4.51±0.76	2.98±0.79	3.77±0.59
40	Monitoring Arterial Line	16.45±3.80	3.95±1.10	3.10±0.87	3.38±0.80
41	Maintaining and Managing the chest tube	16.41±3.33	3.75±0.95	3.16±0.77	3.38±0.78
42	Managing Patients according to infection control protocol	16.39±3.64	4.47±0.84	2.98±0.82	3.39±0.69
43	Administering Subcutaneous Injection	16.35±3.38	4.71±0.62	2.91±0.82	3.71±0.60
44	Administering Intramuscular Injection	16.28±3.49	4.60±0.61	2.92±0.84	3.72±0.59
45	Managing Arterial Line	16.26±3.70	4.21±1.07	3.00±0.88	3.49±0.77
46	Checking Input and Output	16.15±3.79	4.96±0.39	2.80±0.94	3.77±0.55
47	Observing Drainage	15.93±3.72	4.65±0.61	2.82±0.88	3.53±0.71
48	Checking Central Venous Pressure	15.90±3.77	4.23±1.02	2.92±0.85	3.56±0.80
49	Checking Sense, Motor, and Circulation	15.89±3.97	4.48±0.90	2.85±0.92	3.51±0.73
50	Maintaining and Managing H-vac and JP tube	15.88±3.51	3.75±1.24	3.03±0.81	3.35±0.84

Of the 99 ICU nursing activities, 68 were rated at the higher level of frequency by more than 4 points, however, 3 were rated at the lower level of frequency by less than 2 points. Higher rankings of frequency were assessing the level of consciousness, tube feeding and observation, monitoring of oxygen saturation (SaO2), changing positions, checking vital signs, administering oral medication, checking fluid input and output, applying comfort for positioning, performing respiratory care, and preventing falls. The other items that were infrequently performed were managing peritoneal dialysis, managing chemotherapy, managing cardiocentesis.

Of the 99 ICU nursing activities, 44 were the higher level of urgency more than 3 points. Only measurement of the body was judged as a lower level of urgency (mean 1.83). The top 10 nursing activities rated as higher in urgency for an ICU nurse were highest preparing and maintaining E-tubes (mean 3.85), taking ambu bag (mean 3.47), preparing and maintaining tracheostomy (mean 3.71), applying and taking off the ventilator (mean 3.71), performing the Advanced Cardiopulmonary Life Support (ACLS) (mean 3.67), administering oxygen (mean 3.63), applying and weaning of Intraaortic Balloon Pumping (IABP) (mean 3.60), taking suction of airway (mean 3.56), assessing level of consciousness (mean 3.55), giving blood (mean 3.55).

Of 99 ICU nursing activities, 85 were rated as necessary at the higher level of performance competency more than 3 points less than 2 points: Higher rankings were checking vital signs (mean 3.88), tube feeding and observation (mean 3.80), administering oxygen (mean 3.80), suctioning of airways (mean 3.80), checking blood sugar (mean 3.79), monitoring oxygen saturation (SaO2, mean 3.79), performing respiratory care (mean 3.78), applying nebulizer (mean 3.77), checking input and output (mean 3.77), measurement of the body (mean 3.77).

Other ICU nursing activities, such as recording the Electrocardiogram (ECG), performing ACLS, caring related Continuous venovenous hemofiltration (CVVH), and applying and weaning of the IABP scored high in the Important Index (above 15.75) but low in performance competency (below 3 points).

Performance Competency of ICU Nursing Activities of Nursing Students

Of 99 ICU nursing activities, 44 were ranked as the higher level of performance competency by more than 3 points (See Table 4). Of these, checking blood sugar (mean 3.90) and monitoring oxygen saturation (mean 3.90) was seen as the highest performance competency of nursing students, checking vital signs (mean 3.88), applying nebulizers (mean 3.83), administering oral medications (mean 3.80), integrative nursing care (mean 3.74), administering oxygen (mean 3.72), preventing falls (mean 3.68), changing positions (mean 3.67), suctioning of airways (mean 3.61).

However, 10 ICU nursing activities of nursing students were ranked at the lower level of performance competency by less than 2 points. Other infrequent activities ranked as low items were caring peritoneal dialysis, checking and observing intracranial pressure, maintaining and managing the functioning of urostomy and cystostomy, managing Peripheral Intravenous Central Catheterization (PICC), managing cardiocentesis, managing Extra Ventricle Drainage (EVD), observing Pulmonary Artery Pressure (PAP)/Pulmonary Capillary Wedge Pressure (PCWP)/Cardiac Output (CO)/Cardiac Index (CI)/ Left Atrial Pressure (LAP)/Right Atrial Pressure (RAP), managing Swan-Ganz (SG) catheter, nursing care for CVVH, applying and weaning off IABP.

TABLE 4: Nursing activities of Performance Competency of Nursing Students

Rank	Nursing Activities	Minimum	Maximum	Mean	SD†
1	Checking Blood Sugar	2.00	4.00	3.90	0.31
2	Monitoring oxygen saturation	3.00	4.00	3.90	0.29
3	Checking Vital sign	3.00	4.00	3.88	0.33
4	Applying nebulizer	3.00	4.00	3.83	0.37
5	Administering oral medication	1.00	4.00	3.80	0.44
6	Being come together	3.00	4.00	3.74	0.44
7	Administering oxygen	3.00	4.00	3.72	0.45
8	Preventing falls	3.00	4.00	3.68	0.47
9	Changing the position	2.00	4.00	3.67	0.48
10	Taking the suction of airway	2.00	4.00	3.61	0.53
11	Taking the tube feeding	3.00	4.00	3.60	0.49
12	Taking Ambu bag	2.00	4.00	3.58	0.52
13	Providing comfortable position	2.00	4.00	3.54	0.52
14	Performing respiratory care	2.00	4.00	3.53	0.55
15	Applying ice and hot pack	2.00	4.00	3.53	0.52
16	Administering Intradermal Injection	1.00	4.00	3.42	0.59
17	Managing Dangers	2.00	4.00	3.40	0.56
18	Administering Fluid	1.00	4.00	3.40	0.56
19	Administering Inhalator	2.00	4.00	3.39	0.60
20	Caring Inpatients	2.00	4.00	3.36	0.53
21	Administering Intramuscular Injection	1.00	4.00	3.35	0.58
22	Collecting Others Sample	2.00	4.00	3.32	0.56
23	Administering local medication	1.00	4.00	3.32	0.68
24	Administering Subcutaneous injection	1.00	4.00	3.32	0.60
25	Managing Care givers	2.00	4.00	3.30	0.54
26	Taking Restriction	2.00	4.00	3.29	0.60
27	Caring Transfer and Discharge	2.00	4.00	3.28	0.59
28	Checking Input and Output	2.00	4.00	3.24	0.58
29	Administering sublingual medication	1.00	4.00	3.24	0.70
30	Taking Electrocardiography	1.00	4.00	3.24	0.70
31	Managing Patients according to infection control protocol	2.00	4.00	3.24	0.53
32	Performing Simple dressing	1.00	4.00	3.17	0.60
33	Performing simple catheterization	1.00	4.00	3.14	0.63
34	Performing Enema	1.00	4.00	3.14	0.62
35	Helping Sleep	2.00	4.00	3.10	0.57
36	Managing Environments	1.00	4.00	3.08	0.60
37	Inserting Intravenous cannula	1.00	4.00	3.06	0.65
38	Assisting muscle relaxation	2.00	4.00	3.05	0.62
39	Assessing and Managing Bed sore	2.00	4.00	3.04	0.59
40	Taking Rang of motion exercise	1.00	4.00	3.02	0.73
41	Inserting and Managing Foley catheter	1.00	4.00	3.02	0.67
42	Nursing care related to cast	1.00	4.00	3.02	0.64
43	Administering suppository	0.00	4.00	3.01	0.80
44	Giving blood	1.00	4.00	3.00	0.61

†SD : Standard Deviation

Nursing Activities-Importance Index-High/ Performance Competency Students-Low

Of 99 ICU nursing activities, 28 nursing activities scored high on the Important Index (above 15.75) completed by ICU nurses but low score in performance competency outcomes of nursing students (below 3 points) (See Table 5). Of them, especially, performance competency of nursing students, such as managing External Ventricular Drainage (EVD) (mean 1.81), caring related to CVVH (mean 1.55), applying and weaning of IABP (mean 1.55) showed below average 2 points.

TABLE 5: Nursing activities that importance index score is high but performance competency of nursing students is low

Nursing Activities	Importance index	performance competency (nursing students)
Assessing Level of Consciousness	19.20±2.85	2.87±0.51
Preparing and maintaining E-tube	19.07±2.05	2.99±0.66
Caring the application and weaning of ventilator	19.05±2.71	2.32±0.71
Preparing and maintaining tracheostomy	18.96±2.72	2.89±0.66
Collecting the emergency specimens	18.72±2.85	2.42±0.64
Assessing respiratory status(Lung sound, Respiratory pattern, etc.)	18.66±2.99	2.83±0.64
Performing the ACLS	18.13±3.15	2.37±0.74
Assessing the Function of the Cranial nerve	17.86±3.40	2.48±0.58
Physical assessment of circulating system(including heart sound)	17.68±3.44	2.68±0.66
Preventing self-injury in patients	17.34±3.55	2.95±0.71
Evaluating and recording CPR	17.24±3.98	2.57±0.66
Collecting blood sample	17.14±3.69	2.95±0.72
Reading the Electrocardiography	17.11±3.98	2.29±0.58
Managing Central venous line	16.91±3.60	2.32±0.66
Assessing reflex activity	16.73±3.62	2.65±0.56
Caring related to CVVH	16.72±3.99	1.55±0.63
Assessing and managing ICU related delirium	16.66±3.62	2.31±0.65
Managing the pain	16.65±3.44	2.90±0.56
Assessing difficult defecation and urination	16.57±3.65	2.80±0.59
Applying and weaning of IABP	16.55±3.16	1.55±0.56
Maintaining and Managing EVD	16.50±3.15	1.81±0.66
Assessing the risk factors and symptoms of infection	16.47±3.47	2.94±0.58
Maintaining and Managing the chest tube	16.41±3.33	2.36±0.65
Maintaining and Managing A-line	16.26±3.70	2.11±0.68
Observing Drainage	15.93±3.72	2.88±0.57
Checking Central Venous Pressure	15.90±3.77	2.09±0.75
Checking Sense, Motor, and Circulation	15.89±3.97	2.67±0.78
Maintaining and Managing H-vac and JP tube	15.88±3.51	2.89±0.70

Ten items among 14 ICU Core Skills within the Department of Nursing at CHU were consistent with nursing activities in ICU upper 25 % of the Important Index nominated by ICU nurses.

DISCUSSION

This study has demonstrated that the level of urgency, frequency, performance competency, and importance index of ICU nursing activities of ICU nurses and nursing students, and was able to provide the fundamental data for the establishment of ICU Nursing Core Skills for nursing students of CHU by clarifying nursing skills/activities used in ICU. This finding is consistent with past studies conducted by Lee et al. (2007).

Of 99 ICU nursing activities, 50 nursing activities were found to be relevant to the top 25% nursing activities on the higher importance index. 68 activities were on the higher level of frequency by more than 4 points; 44 were on the higher level of urgency by more than 3 points and 44 were the higher level of performance competency by more than 3 points. These nursing activities were related to direct patient care and were those which involved frequent use of high-tech devices. Therefore, it was deemed that nursing practical education should include these nursing activities within learning events.

ICU nursing activities that showed the higher level of frequency (more than 4 points) include assessing the level of consciousness, tube feeding and observation, monitoring of oxygen saturation (SaO2), changing position, administering oral medication. Of these, assessing the level of consciousness and monitoring of oxygen saturation (SaO2) coincided with findings of Lee et al. (2007) that high frequency nursing activities (more than 4 points) included monitoring ventilation (SpO2, End tidal CO2), observing hemodynamic condition (Blood pressure (BP), central venous pressure (CVP)), assessing peripheral circulation, assessing level of consciousness using Glasgow coma scale (GCS), pupil size (P/S), pupil light reflex (L/R), Limb movement.

Top 10 nursing activities of the higher urgency of ICU nurse found that preparing and maintaining E-tube was highest, taking ambu bag, preparing and maintaining tracheostomy, applying and taking off the ventilator, performing the ACLS, administering oxygen, applying and weaning of IABP, taking suction of airway, assessing level of consciousness, giving blood. These results were somewhat different results of Lee et al. (2007). Nursing activities of higher Urgency with more than 3 points in the study of Lee et al. (2007) showed appropriately respond to medication error, reading the ECG and implementing appropriate interventions when necessary, observing hemodynamic conditions (PAP, PCWP, CO, CI, Pulmonary vascular resistance (PVR), systemic vascular resistance (SVR), LAP), managing according to infection control protocol, observing hemodynamic conditions (BP, CVP).

ICU nursing activities of higher level of performance competency with more than 3 points found that checking vital signs was highest, tube feeding and observation, administering oxygen, taking suction of airway, checking blood sugar, monitoring oxygen saturation, performing respiratory care, applying nebulizer, checking input and output, measurement of the body. Of these, checking vital sign, taking ECG, and assessing the level of consciousness coincided with findings of Lee et al. (2007) that high performance competency of ICU nurse indicated coordinating and educating maintenance for medical equipment, observing hemodynamic condition (BP, CVP), taking 12-lead ECG if necessary, assessing level

of consciousness using GCS, P/S, L/R, Limb movement, appropriately respond to medication error. Given the context of ICU nursing and the likelihood that patient situations often involve a sense of urgency and changes in patient's conditions are common, early detection or prevention of accidents and complications of change in status is within the remit of the usual role of the ICU nurse. This has implications for nurse educators in that planning for nursing education focussing on ICU nursing activities should include the appropriate nursing content and processes and involve the use of the latest equipment common to the ICU. In this way students can acquire new knowledge and skills about the use of equipment related to treatment and nursing care.

The highest importance index of nursing activity is administering oxygen, taking ambu bag, assessing level of consciousness, taking suction of airway, preparing and maintaining E-tube, applying and taking off the ventilator, preparing and maintaining tracheostomy, monitoring oxygen saturation, and so on, followed by. In previous study, Nursing activities was higher Importance index (more than 16) found such as observing heomodynamic condition (BP, CVP), giving blood, managing patients according the infection control protocol, caring patients underwent Continuous renal replacement therapy (CRRT) from startup to end (Lee et al., 2007). These results of the study showed similar results as in this study.

Nursing activities of ICU nurse, such as recording the ECG, performing ACLS, caring related CVVH, and applying and weaning of the IABP showed high score in Important Index (above 15.75) but low score in performance competency (below 3 points). These nursing activities were the professional nursing practice areas. The result of Lee et al. (2007), nursing activities scored high in importance index (more than 15) but scored low in self competency (less than 3) in the activities; physical examination of respiratory system, physical examination of circulatory system, intubation of airway, planning and performing application and weaning of ventilator, and so on. These results showed similar results as in this study.

Of 99 ICU nursing activities, 44 were the higher level of performance competency more than 3 points in nursing students. Of these, checking blood sugar and monitoring oxygen saturation was the highest performance competency of nursing students. Considering these results, the nursing activities that were high ranked importance index also ranked highly in performance competency of nursing students. The other side low ranked items with less than 2 points of performance competency of nursing students include caring peritoneal dialysis, checking and observing intracranial pressure, maintaining and managing the function of urostomy and cystostomy, managing PICC (peripheral intravenous center catheterization), caring cardiocentesis, managing EVD, observing PAP/PCWP/CO/CI/LAP/RAP, managing SG catheter, caring related to CVVH, applying and weaning of IABP. Whilst this is the content that is available for the professional nursing practice of ICU nursing activities, nursing students perform these activities with some difficulty.

Ten items among 14 ICU Core Skills of Department of Nursing at CHU were consistent with nursing activities in ICU upper 25 % of the Important Index. Nursing activities showed high score in Important Index (above 15.75) of ICU nurse but low score in performance competency of nursing students (below 3 points) include caring the application and weaning of ventilator, assessing level of consciousness, maintaining and managing the chest tube, checking central venous pressure. Our results indicate that these items need to be reinforced in the school ICU Core Skill lab. Also, nursing activities such as preparing and

maintaining intubation of E-tube, caring the application and weaning of ventilator, and preparing and maintaining tracheostomy shown significant activities in the ICU, but performance competency among nursing students were lower. Also, preparing and maintaining intubation of E-tube and preparing and maintaining tracheostomy which were ranked as of high importance were excluded in ICU Core Skill lab. Given the emphasis imposed on the links among learning outcomes, and learning and teaching events (Conway & McMillan, 2010; Little & McMillan, 2014), we consider that it is necessary to modify the ICU Core Skill items and educational content.

CONCLUSION

This study used an exploratory survey

1) to identify the extent to which the ICU Core Skill were taught in the Nursing School laboratory education component were relevant, and

2) to investigate the performance competency of nursing students on these skills.

The study has demonstrated the perceived level of urgency, frequency in performance, student performance competency, and rating on an importance index of ICU nursing activities of ICU nurses and nursing students, and provided the fundamental data for the establishment of ICU Nursing Core Skills for nursing students of CHU by clarifying nursing skills/activities used in ICU. In that way, we could make the most efficient use of the fundamental data for efficient operations and complement the ICU Core Skill Lab.

Of 99 ICU nursing activities, 50 nursing activities found was relevant to top 25% nursing activities of the higher importance index, 68 activities of the higher level of frequency (more than 4 points), 44 activities were of the higher level of urgency (more than 3 points) and 44 were of the higher level of performance competency (more than 3 points). Ten items among 14 ICU Core Skills of Department of Nursing at CHU were consistent with nursing activities in ICU upper 25 % of the Important Index.

Our results indicated that these items need to be reinforced in the school ICU Core Skill lab. Also, we consider that it is necessary to modify the ICU Core Skill items and educational content.

For further research based on the findings, we recommend as follows:

1) On the basis of the results of this study, it is necessary to correct and revise the ICU Core Skill items and contents listed at Cheju Halla University.

2) Future study is suggested to examine and evaluate the ability of nursing students who perform nursing activities showed higher Importance Index and frequency in this study.

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