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Research Article

Priority of High-fidelity Simulation Topics for Adult Nursing Care Using Delphi Method

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Abstract

Background and Objective: Currently, high-fidelity simulation training is the most commonly used method for undergraduate nursing education in Korea. Thus, it is important to select appropriate simulation scenarios. To prioritize the development and implementation of high-fidelity simulation scenarios based on Korean learning objectives of adult nursing education. **Materials and Methods:** Twenty-six individuals including nurse managers and nursing professors who taught or simulated adult nursing were targeted for a Delphi survey. The first round of survey collected different opinions on adult nursing simulation training using open-ended questions while the second and the third rounds of the survey dealt with opinions to prioritize key diseases/interventions. Descriptive statistics and Mann-Whitney nonparametric analysis were used to process the data. **Results:** 'Respiratory disorders' was assigned the highest priority of learning objectives for disease in each major category. In the subcategory of respiratory disorders, 'ineffective gas exchange disorder' was assigned the highest priority among key diseases/interventions. The mean score for all major categories was 3.92 ± 0.61 . The mean score for all subcategories was 3.96 ± 0.51 . Among key diseases/interventions, obstructive pulmonary disease under 'Respiratory diseases', coronary artery disease under 'Heart tissue perfusion failure' and fluid therapy under 'Body fluid imbalance' received a high priority. **Conclusion:** The current work contributes to the design of priority standards under high-fidelity simulation scenarios to accomplish learning objectives of adult nursing education based on professional surveys of nursing professors and nurse managers.

Key words: High-fidelity simulation, Delphi method, education, adult nursing, nursing students

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Innovative ways of knowledge acquisition and convergence of human resources can be fostered by a creative society exposed to higher education¹. Recently, nursing education based simulation is regarded as an important process that can reflect critical thinking, situation judgment and nursing practice². Nursing education using simulation provides a simulated situation in the clinical field. This is supported by various evidence showing that nursing education based simulation is effective in acquiring knowledge and various psychomotor developments^{3,4}. In particular, students can improve their problem-solving abilities in a safe educational environment, resulting in high learning satisfaction⁵. So Appropriate simulation can be used as an effective learning tool in academic settings⁶. It also represents a new educational technique to train convergent nursing personnel.

Since 2006, three-fourths of 201 nursing programs in Korea have incorporated simulation into their curriculum. Simulation-based nursing education studies have been published in Korea⁷. Simulation training is becoming increasingly important in adult nursing since the Korean Accreditation Board of Nursing Education (KABONE)⁸ has approved the replacement of up to 12% of clinical training hours with simulation training. According to the current trends underlying the methods of undergraduate nursing education in Korea, simulation training is most commonly used in adult nursing except for one case where it was used for theoretical and training topics⁹. Thus, it is essential to develop simulation education on an ongoing basis¹⁰. Appropriate simulation scenarios need to be selected before implementation.

Although studies related to simulation in Korea, systematic review on design and measurement variables⁷, integrative review on operation characteristics¹¹ and trend analysis⁹ have been reported, analysis of scenario subject is insufficient. The KABONE covers three topics in simulation training standards: Nursing patients with high blood pressure, chest pain and intracranial hypertension⁸. In medical education, simulation education prioritization study has been conducted for effective patient assessment¹². However, in the field of nursing, research on simulation education has not been reported yet. Especially, in Korea, 61.5% of scenarios occur without any criteria⁶. In the absence of a standardized curriculum, the development and application of simulation scenarios depend largely on the discretion of individual instructor.

In Korea, there are major categories, subcategories and key diseases/intervention about adult health nursing¹³. With the increasing importance of simulation training in adult nursing, the current study presented the criteria for learning objectives of high-fidelity simulation nursing scenarios targeting Korean nursing students and prioritizing key diseases/interventions for simulation training in adult nursing programs.

MATERIALS AND METHODS

Study design: A cross-sectional study using a Delphi survey method based on a three-step method was conducted to prioritize high-fidelity simulation scenarios.

Participants: Panels consisting of small groups of at least 10-15 participants yielded useful results in Delphi study¹⁴. Based on preliminary findings of a typical response rate in the range of 50-70%, the present study selected 29 panel members, including nurse managers experienced in teaching simulation, adult nurses who managed college nursing students and nursing professors who taught adult nursing or simulation. The panel members were selected from eight institutions. The research team selected expert participants using a snowball sampling technique. The research team obtained participants' consent after explaining the purpose of this survey. The survey questionnaire was distributed and retrieved electronically. Written consent was obtained from 27 out of 29 panels before completing the first and second rounds of the survey. The final number of panel numbers was 26 after excluding a single panel member who failed to answer more than 10% of questions in the third round of the survey.

Instruments: The questionnaire was developed according to the learning objectives of the adult nursing program developed by the Korean Society of Adult Nursing for key diseases and interventions. The participants' general characteristics, simulation management and priority were covered according to the Learning Objectives of Adult Nursing Program. Participants' general characteristics included sex, age, terminal degree, years of clinical experience, years of teaching experience with adult nursing and current workplace. Simulation management comprised simulation duration, the number of members on the simulation team and pre-simulation training. The Learning Objectives of Adult Nursing included 10 major categories. Thirty-two subcategories within these 10 major categories and 199 relevant key diseases/interventions were developed¹³.

Table 1: Priority criteria in third Delphi survey

Criteria	Question
Appropriateness	Do you think that it is logically appropriate to develop simulation scenario of key diseases/interventions in adult nursing by considering several standards?
Effectiveness	Is simulation operation based on developed scenarios of relevant diseases more effective than other instructional techniques?
Applicability	How much the developed scenario of relevant diseases is applicable in clinical practices and how much the learned content from simulation scenario training is applicable in the field in practice?
Burden of disease	How much it is related to the prevalence of diseases?

Data collection: Ethical approval was obtained from Korean National Institute for Bioethics Policy (approval number: KONIBP #P01-201805-23-009). The current study was performed from May 4, 2018 to June 4, 2018 in Gwangju city of South Korea.

In the first Delphi survey, open-ended questions were designed based on literature review and preliminary investigation of the research team. Various views on simulation related to adult nursing and priority opinions among major categories within the adult nursing learning objectives were collected. The results of the first Delphi survey were obtained to facilitate participants' response to the second Delphi survey based on previous results. In the second survey, the questionnaire was designed to determine the importance of subcategories and key diseases/interventions of learning objectives in adult nursing based on selective questions using a five-point Likert scale. Finally, in the third Delphi survey, results of the priority analysis in the second Delphi survey were included to enable participants' response to priorities based on four criteria (appropriateness, effectiveness, clinical application and disease burden) suggested by prior works¹⁵ using a five-point Likert scale. Questions for each criteria are shown in Table 1.

Statistical analysis: All data were analyzed using SPSS version 21.0. Statistical significance was set at $p < 0.05$. When analyzing participants' general characteristics, frequency, percentage, mean and standard deviation were used. Mean and standard deviation were used to analyze the importance of major categories and subcategories in the first and second rounds of the Delphi survey. The mean and standard deviation of composite scores were calculated after weighing each criterion in the first and second rounds of the survey. To compare composite scores between nursing professors and nurse managers, Mann-Whitney non-parametric analysis of variance was performed.

RESULTS

General characteristics of participants: Table 2 lists the general characteristics of participants. The 26 participants included 13 nursing professors and 13 nurse managers. The participants included 2 (7.41%) males and 24 (92.59%) females. The participants' average age, average clinical experience in adult nursing and average instructional experience were 46.31, 17.75 and 3.84 years, respectively.

Priority of educational goals in adult nursing for major and subcategories: The results of perceived importance of major categories and subcategories of learning objectives in adult nursing and scores for each major category and subcategory are shown in Table 3. 'Respiratory diseases' had the highest mean score (4.78). Analysis of important subcategories within major categories yielded the highest mean score (4.74) for inefficient gas exchange under 'Respiratory diseases'. The mean score for all major categories was 3.92 ± 0.61 and the mean score for all subcategories was 3.96 ± 0.51 .

Priority of key diseases and interventions in adult nursing: The total weights of scores based on the weight of key diseases/interventions are listed in Table 4. The weighted score for obstructive pulmonary disease was the highest (4.37) among 'Respiratory diseases' while coronary artery disease scored the highest (4.32) under 'Heart tissue perfusion failure'. Fluid therapy showed the highest mean score (4.12) under 'Body fluid imbalance' while increased intracranial pressure recorded the highest score (4.14) for 'Brain tissue perfusion failure'. Stroke showed the highest weighted score (4.02) under 'Dysphagia'.

Difference in weighted score between nursing professors and nurse managers: The differences in total and weighted scores between nursing professors and nurse managers are presented in Table 5. No significant difference in total and weighted scores existed between the two groups (nursing professors and nurse managers) except for coronary artery disease in 'heart tissue perfusion failure', which varied significantly at $p < 0.05$ level.

Table 2: General characteristics of participants (n = 26)

Characteristics	Total (n = 26) N (%) or Mean±SD	Nursing professors (n = 13) N (%) or Mean±SD	Nursing practitioners (n = 13) N (%) or Mean±SD
Sex			
'Male'	2 (7.41)	2 (15.38)	0 (0.0)
'Female'	24 (92.59)	11 (84.62)	13 (100.0)
Age (years)	46.31±6.53	42.7±6.68	49.79±3.87
Years of clinical experience in adult nursing	17.75±9.83	9.5±5.46	25±6.03
Years of teaching experience in adult nursing	3.84±6.48	4.28±2.27	3.51±8.7
Terminal degree			
'Bachelor'	9 (34.62)	0 (0.0)	9 (69.23)
'Master'	5 (19.23)	1 (7.69)	4 (30.76)
'Doctorate'	12 (46.15)	12 (92.31)	0 (0.0)

Table 3: Priority of educational goals in adult nursing for major- and sub-categories of diseases based on opinion of experts (n = 26)

Major categories	Mean±SD	Ranking	Sub-categories	Mean±SD
Immune body injury	3.63±0.74	6	Emergency patient problem	4.81±0.48
			Surgery patient problem	4.33±0.68
			Impaired skin integrity	3.41±0.80
			Immune abnormality	3.19±1.00
Changes in resting balance	3.52±0.89	8	Ache	4.59±0.69
			Nausea/vomiting	4.00±0.78
			Pain	3.59±0.97
			Fatigue	2.93±0.73
Ingestion absorption and metabolic disorders	4.04±0.81	5	Dysphagia	4.00±0.94
			Dyschezia	4.00±0.68
			Celiac disease	3.93±0.73
			Nutrition imbalance	3.78±0.97
Body fluid and urination disorders	4.41±0.69	3	Electrolyte imbalance	4.59±0.57
			Body fluid imbalance	4.30±0.61
			Urination disorder	3.96±0.71
Activity and self-care disorders	3.19±0.94	9	Mobility disorder	3.78±0.93
			Self-care deficit	3.59±0.97
			Disuse syndrome	3.26±0.86
Cardiovascular and hematologic disorders	4.74±0.45	2	Heart tissue perfusion disorder	4.57±0.57
			Cardiac output reduction	4.48±0.64
			Peripheral tissue perfusion disorder	3.93±0.83
			Hematologic disorder	3.52±0.94
			Activity persistence disorder	3.41±1.01
Respiratory disorders	4.78±0.42	1	Inefficient gas exchange	4.74±0.45
			Inefficient airway cleanliness	4.67±0.55
			Ventilatory defect	4.41±0.64
			Brain tissue perfusion disorder	4.48±0.64
Cognitive and neurological disorders	4.26±0.66	4	Neurokinetic disorder	3.96±0.76
			Cognitive impairment	3.81±0.68
			Endocrine dysregulation	3.96±0.82
Control disorders	3.56±0.80	7	Endocrine dysregulation	3.96±0.82
Sensory disorders	3.07±0.92	10	Visual acuity and impairment	3.52±1.05
			Hearing and hearing impairment	3.19±0.83
Mean of major categories	3.92±0.61		Mean of subcategories	3.96±0.51

DISCUSSION

The objective of the current study was to prioritize key diseases/interventions of adult nursing and develop adult nursing simulation scenarios for college nursing students. As shown by the study results, the highest scores among the learning objectives of adult nursing were recorded by 'Respiratory diseases' in major category, 'Inefficient gas change' in sub-category and 'Obstructive pulmonary disease'

under key diseases/interventions. No significant difference between nursing professors and nurse managers was detected except for coronary artery disease.

Based on the results of this study, 'Respiratory diseases' was assigned the highest perceived importance among major disease categories. According to a previous study⁶, the respiratory system was explored only in three studies although high-fidelity simulation focusing on medical-surgical nursing was investigated in multiple studies¹⁶⁻¹⁸, warranting additional

Table 4: Priority of key diseases/interventions to develop simulation scenarios in adult nursing based on opinion of experts (n = 26)

Major and subcategories	Key diseases/interventions	Priority			Effectiveness of scenarios	Clinical applicability	Burden of disease
		Total weighted scores*	within educational goal (unweighted)	Appropriateness of developing scenarios			
Respiratory disorders	'Obstructive pulmonary disease'	4.37	4.63±0.56	4.35±0.63	4.28±0.74	4.46±0.81	4.54±0.58
	Respiratory serious disease	4.12	4.67±0.48	4.23±0.82	3.84±0.94	4.42±0.86	4.15±0.73
	Respiratory alkalosis/acidosis	3.75	4.15±0.77	3.73±0.87	3.80±0.82	3.81±0.94	3.50±0.76
	Inflammatory respiratory disease	3.70	4.30±0.54	3.65±0.94	3.56±0.71	3.77±0.91	4.20±0.76
	Infectious respiratory disease	3.52	3.89±0.80	3.46±0.71	3.44±0.65	3.58±0.81	3.88±0.80
	Traumatic respiratory disease	3.28	3.93±0.92	3.35±0.69	3.36±0.64	3.15±0.67	3.04±0.72
	Respiratory neoplastic disease	2.96	3.81±0.88	3.00±0.63	2.88±0.83	2.92±0.80	3.15±0.88
Heart tissue perfusion failures	'Coronary artery disease'	4.32	4.59±0.69	4.31±0.88	4.20±1.04	4.42±0.86	4.58±0.70
	Heart failure	4.07	4.44±0.64	4.12±0.77	3.92±0.86	4.23±0.91	4.12±0.71
	Arrhythmia	3.91	4.19±0.68	3.85±0.73	3.84±0.90	4.04±0.89	4.12±0.77
Cardiac output reduction	Cardiac compression	3.11	4.00±0.96	3.15±0.97	3.16±1.03	3.12±1.07	2.77±0.86
	Heart failure	4.07	4.59±0.50	4.15±0.92	3.96±0.89	4.12±0.99	4.12±0.77
	Heart valve disease	3.35	4.07±0.73	3.31±0.68	3.32±0.75	3.42±0.99	3.46±0.95
	Cardiac compression	3.11	4.00±1.00	3.12±0.86	3.16±1.11	3.15±1.05	2.81±0.90
Peripheral tissue perfusion failures	Endocarditis	3.08	3.93±0.92	3.08±0.84	3.04±0.98	3.19±0.94	3.04±0.87
	Hypertension	3.81	3.89±0.89	3.65±1.06	3.72±1.14	3.88±1.14	4.54±0.65
	Deep vein thrombosis	3.70	4.30±0.78	3.62±0.94	3.76±0.88	3.73±0.96	3.73±1.08
	Aortic aneurysm	3.60	4.33±0.88	3.44±1.19	3.76±1.05	3.65±1.06	3.50±0.99
Hematologic disorders	Arteriosclerosis	3.28	3.81±0.83	3.08±0.84	3.16±1.03	3.42±1.03	4.08±0.89
	Leukemia	3.12	4.11±0.97	3.04±1.00	3.16±0.94	3.23±1.07	3.00±0.85
	Disseminated intravascular coagulation	2.94	3.89±1.09	2.85±0.97	3.04±0.89	3.12±0.95	2.58±0.90
	Respiratory disease	4.21	4.41±0.75	4.15±0.78	4.16±0.94	4.27±0.92	4.42±0.70
Activity persistence disorder	Coronary artery disease	4.12	4.26±0.81	4.00±0.85	4.16±0.94	4.12±0.91	4.42±0.86
	Heart failure	3.98	4.41±0.64	3.96±0.72	3.92±0.91	4.04±1.04	4.12±0.91
	Heart valve disease	3.29	3.89±0.75	3.15±0.67	3.32±0.85	3.35±0.80	3.58±0.86
	High/hypokalemia	3.84	4.52±0.64	3.81±0.98	3.84±0.94	3.92±0.89	3.77±1.11
Electrolyte Imbalance	High/hyponatremia	3.37	4.04±0.71	3.23±0.82	3.44±0.71	3.50±0.81	3.32±0.80
	Burn	3.25	4.15±0.72	3.35±0.75	3.36±0.70	3.19±0.69	2.62±0.90
	Low/hypercalcemia	2.92	3.81±0.68	2.81±0.69	3.04±0.68	2.96±0.72	2.85±0.78
	'Fluid therapy'	4.12	4.37±0.74	4.04±0.66	4.04±0.79	4.27±0.72	4.35±0.94
Body fluid imbalance	Dehydration	3.92	4.37±0.63	3.85±0.83	4.04±0.68	4.00±0.63	3.58±1.06
	Edema	3.43	3.96±0.71	3.27±0.72	3.48±0.65	3.50±0.76	3.64±0.86
	Burn	3.36	4.37±0.63	3.27±0.67	3.56±0.77	3.46±0.81	2.73±1.04
	Acute/chronic renal failure	3.86	4.41±0.69	3.92±0.98	3.72±0.94	3.88±1.03	4.04±0.92
Urinary disorders	Renal replacement therapy	3.49	3.89±0.89	3.35±1.16	3.48±1.16	3.73±1.25	3.54±1.07
	Metabolic acidosis	3.36	3.81±0.74	3.23±0.99	3.38±0.82	3.54±0.90	3.42±0.90
	Bladder cancer	2.46	3.63±1.08	2.35±0.85	2.60±0.82	2.50±0.71	2.31±0.84
	'Rise in cranial pressure'	4.14	4.56±0.64	4.08±0.89	4.20±0.82	4.19±0.80	4.04±0.77
Brain tissue perfusion failures	Stroke	4.10	4.48±0.64	4.12±0.82	4.08±0.81	4.00±0.89	4.31±0.68
	Aneurysms	3.42	4.19±0.88	3.38±1.02	3.44±1.04	3.46±0.99	3.38±1.02
	Traumatic brain injury	3.41	4.30±0.72	3.38±0.80	3.48±0.71	3.38±0.75	3.35±0.89
	'Stroke'	4.10	4.41±0.84	4.08±0.84	4.08±0.91	4.08±0.81	4.27±0.78
Neurokinetic disorders	Spinal trauma	3.47	4.07±0.87	3.54±0.86	3.52±0.87	3.44±0.82	3.08±0.80
	Myasthenia	2.69	3.81±1.04	2.69±0.84	2.76±0.78	2.76±0.72	2.31±0.88
	Stroke	4.09	4.30±0.67	4.15±0.67	4.08±0.81	4.04±0.96	4.04±0.96
Recognition disorders	Unconsciousness	3.56	4.22±0.85	3.52±0.96	3.68±1.03	3.46±1.03	3.46±0.95
	Traumatic brain injury	3.47	4.48±0.58	3.50±0.71	3.56±0.87	3.38±0.70	3.23±0.76
	Stroke	4.02	4.33±0.68	4.08±0.80	3.96±0.93	4.04±0.92	4.04±0.87
Dysphagia	Gastroesophageal reflux/esophageal	3.30	3.81±0.74	3.38±0.64	3.24±0.83	3.27±1.00	3.31±1.05
	Hiatal hernia						
Bowel obstruction disorders	Inflammatory growth disease	3.18	3.96±0.59	3.12±0.77	3.16±0.85	3.35±0.85	3.19±0.85
	Rectal cancer	3.08	4.15±0.91	3.04±0.77	3.08±0.91	3.19±0.85	3.04±0.82
	Colon cancer	3.07	4.19±0.83	3.08±0.84	3.00±0.88	3.20±1.00	3.04±0.82
Digestion absorption disorder	Ileus	3.63	4.04±0.65	3.54±0.81	3.72±0.98	3.77±0.99	3.38±0.75
	Peritonitis	3.44	3.85±1.03	3.46±0.95	3.52±0.92	3.38±0.98	3.19±0.94
	Stomach cancer	3.33	4.07±0.92	3.31±0.84	3.24±0.97	3.38±1.02	3.62±0.70
	Pancreatic cancer	3.01	3.96±1.04	3.00±0.89	3.00±0.91	3.12±0.91	2.84±0.94
	Liver cancer	3.01	3.81±0.92	3.04±0.82	2.96±0.89	2.96±0.87	3.23±0.76
	Crohn's disease	2.90	3.89±0.80	2.88±0.77	2.96±0.79	2.88±0.82	2.77±0.86

Table 4: Continue

Major and subcategories	Key diseases/interventions	Total weighted scores*	Priority	Appropriateness of developing scenarios	Effectiveness of scenarios	Clinical applicability	Burden of disease
			within educational goal (unweighted)				
Nutrition imbalance	Gastrointestinal bleeding	3.97	4.22±0.75	3.96±0.87	3.96±0.93	4.00±0.89	3.96±1.00
	Levin and PEG tube	3.82	3.96±0.76	3.58±0.95	4.04±0.89	3.81±0.90	3.88±0.91
	Esophageal bleeding	3.73	4.07±0.68	3.65±0.89	3.80±0.96	3.77±0.99	3.69±0.93
	Total parenteral nutrition	3.71	4.04±0.85	3.54±0.86	3.80±1.04	3.77±0.91	3.92±0.93
	Ostomy	3.71	3.93±0.73	3.62±0.70	3.80±0.82	3.81±0.94	3.50±0.65
Emergency patient	Gastrostomy	3.08	3.89±0.85	2.96±0.77	3.33±0.87	2.96±0.79	2.88±0.88
	'Bleeding'	4.31	4.67±0.48	4.27±0.83	4.36±0.81	4.31±0.79	4.27±0.87
	Shock	4.25	4.81±0.40	4.23±0.71	4.32±0.75	4.31±0.79	3.96±0.87
	Traumatic injury	3.72	4.22±0.70	3.73±0.83	3.68±0.80	3.77±0.82	3.77±0.82
Surgical patient	Poisoning	3.15	3.85±0.95	3.15±0.92	3.20±0.91	3.19±0.94	2.88±1.14
	Post-operative nursing	4.37	4.37±0.69	4.24±0.83	4.44±0.71	4.38±0.85	4.58±0.76
Impaired skin integrity	Pre-operative nursing	4.06	3.85±0.66	3.88±0.93	4.12±0.97	4.08±1.02	4.42±0.76
	Burn	3.33	3.81±1.04	3.35±0.69	3.44±0.65	3.38±0.80	2.81±1.17
Immune abnormality	Immune hypersensitivity reaction	3.68	3.94±1.08	3.69±0.84	3.72±0.98	3.69±1.05	3.42±1.17
Endocrine control disorders	Diabetes	4.03	4.37±0.84	3.96±0.60	3.92±0.72	4.16±0.90	4.42±0.76
Ache	'Coronary artery disease'	4.12	4.48±0.80	4.15±0.78	3.92±0.76	4.19±0.90	4.54±0.81
	Surgery	4.03	4.30±0.78	3.92±0.74	4.00±0.76	4.08±0.84	4.40±0.71
Nausea/vomiting	Cancer	3.25	4.22±0.89	3.15±0.83	3.24±0.93	3.23±0.91	3.69±0.79
	'Cranial pressure rise'	4.12	4.33±0.73	4.00±0.75	4.24±0.66	4.12±0.77	4.12±0.73
	PCA	3.80	3.96±0.81	3.69±0.84	3.84±0.80	3.73±0.67	4.15±0.78
Pain	Ileus	3.52	3.93±0.68	3.31±0.88	3.68±0.80	3.58±0.76	3.62±0.75
	Chemotherapy	3.34	4.59±0.64	3.27±1.00	3.38±1.01	3.31±1.09	3.48±0.87
	Terminal disease	3.05	4.22±0.80	2.96±0.89	3.12±0.73	3.00±0.98	3.23±0.82
Fatigue	Changes in body and loss of function	2.92	4.00±0.92	2.80±1.04	3.00±0.82	2.92±0.98	3.08±1.02
	Chronic obstructive pulmonary disease	4.06	4.37±0.69	4.04±0.87	4.08±0.86	3.96±0.96	4.27±0.72
Mobility disorders	Congestive heart failure	3.77	4.41±0.69	3.73±0.96	3.76±1.01	3.77±0.99	3.92±0.93
	Dialysis	3.43	3.93±0.78	3.35±1.23	3.40±1.12	3.54±1.14	3.65±0.75
	Cancer	3.23	4.04±0.81	3.19±0.80	3.12±0.88	3.31±0.84	3.62±0.80
	Back pain	3.14	4.00±0.73	3.08±0.98	3.16±0.94	3.08±0.93	3.46±1.07
Self-care deficit	Joint replacement	3.00	3.93±0.83	2.96±0.82	3.04±0.73	3.00±0.89	3.00±0.89
	'Stroke'	4.00	4.41±0.69	3.96±0.92	3.96±0.98	4.00±0.98	4.23±0.82
Disuse symptoms	Conscious disorder	3.55	4.48±0.70	3.50±0.81	3.60±0.82	3.58±0.99	3.54±0.90
	Spinal cord injury	3.39	4.33±0.83	3.38±0.75	3.40±0.87	3.46±0.71	3.23±0.76
	Parkinson's disease	2.81	3.81±0.74	2.88±0.82	2.80±0.76	2.69±0.68	2.81±0.94
	Amputation	2.61	3.81±0.80	2.65±0.89	2.64±0.70	2.69±0.74	2.19±0.75
	'Stroke'	3.87	4.27±0.72	3.96±0.82	3.76±0.93	3.85±0.88	4.00±0.85
Disuse symptoms	Unconsciousness	3.34	4.31±0.84	3.31±0.79	3.28±0.89	3.42±0.90	3.46±1.03
	Spinal cord injury	3.32	4.38±0.75	3.35±0.80	3.40±0.87	3.23±0.82	3.12±0.82

*Total weighted scores were calculated by considering major categories and subcategories and weights, the ranked one in each major category is shaded

Table 5: Difference in weighted score between nursing professors and nurse managers

Major and subcategories	Key diseases/interventions	Nursing professors	Nurse managers	z	p
		Mean±SD	Mean±SD		
Heart tissue perfusion failure	Coronary artery disease	4.37±0.71	4.27±0.98	-2.318	0.020

research. In addition, contents related to mechanical ventilation in the intensive care unit or emergency scenarios were considered in previous studies related to 'Inefficient gas change'¹⁹⁻²¹. Therefore, additional studies are needed to address the issues of 'Inefficient impaired gas exchange' among general respiratory patients.

The highest weighted score of key diseases/interventions in each major category was assigned to obstructive pulmonary disease in the 'Respiratory disease' category and to coronary

artery disease in 'cardiovascular and hematologic disorders' and fluid therapy in 'body fluid and urination disorder' categories. Coronary artery disease has been investigated in simulation scenarios, but fluid therapy was not identified in previous studies²². It may suggest that fluid therapy has been treated as an intervention in various diseases and not as an independent disease intervention. Thus, a simulation scenario that treats fluid therapy as an independent intervention should be developed.

Nursing professors indicated that coronary artery disease had a high priority while nurses reported that heart failure had a high priority. Simulation scenarios on heart failure are scarce²³, although many previous studies have reported simulation scenarios including heart attack²⁴⁻²⁷. These findings were consistent with responses provided by nursing professors in the present study, which suggests that heart failure is a high priority disease for nurses in practice and under simulation scenarios.

The benefit to instructors and students is dependent on the amount of time spent by nursing instructors in developing simulation scenarios²⁸. Thus, nursing instructors and researchers need to develop scenarios that reflect the priority of key diseases/interventions to accomplish the learning objectives for nursing students. Additionally, these scenarios must be applied in the field and facilitate instructors who perform simulation training. Further concrete and multiple high-fidelity simulation scenarios reflecting real-life experiences for clinical nursing practicum need to be developed and used in simulation learning in adult nursing programs. The goals for effective simulation learning and adult nursing education can be accomplished using focused and high-fidelity simulation scenarios in a variety of contexts reflecting clinical realities.

The present study has important research and practice implications. First, the findings can be used as a reference standard for the selection of high-fidelity simulation scenarios for adult nursing education. Second, the findings may aid nursing researchers in various institutions in extending the scope of their current research and development programs of adult nursing simulation. Third, in the field of nursing practice, it is expected that simulation-based education of clinical nurses will be activated and the quality of patient care will be improved based on these results.

CONCLUSION

The current study showed that obstructive pulmonary disease among 'Respiratory diseases', coronary artery disease under 'Cardiovascular and hematologic disorders' and fluid therapy in 'Body fluid and urination disorder' categories were assigned the highest priority of key diseases/interventions in the adult nursing learning objectives. No significant difference were detected in weighted scores between nursing professors and nurse managers except for coronary artery disease. Thus, the learning objectives of adult nursing may be accomplished based on these results if nursing educators and researchers develop effective and high-fidelity simulation scenarios.

SIGNIFICANCE STATEMENT

The priorities for high-fidelity simulation scenarios to accomplish learning objectives of adult nursing were reported in this study. Simulation scenarios developed in other countries and reported previously were inappropriate in the South Korean environment. Therefore, the current study reflected the nursing environment in South Korea regarding key diseases/interventions to accomplish the learning goals of adult nursing. In particular, as expert panels in this study included professionals from a wide range of clinical practice and educational fields, the contents adequately reflect the importance of adult nursing education and clinical practice. Therefore, simulation training instructors and researchers need to develop high-fidelity simulation scenarios according to their application and effectiveness to achieve learning objectives.

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