Simulation scenarios in Korea according to the learning objectives of adult health nursing: A literature review

Ae Ri Jang¹, In Kyoung Lee² and Hang Nan Cho²*

Abstract: Background With the Korea Accreditation Board of Nursing Education emphasizing the importance of including the proper operation of simulation exercises to the certification criteria of simulation education, there is a need to synthesize literature on simulation scenarios related to adult health nursing according to the learning objectives. Methods To achieve this purpose, a literature review guided by the PRISMA statement was conducted in several databases. The Health Insurance Review Assessment Risk of Bias (HIRA-RoB) was used to analyze selected papers based on agreed criteria. Twenty-six articles (40 scenarios) were included in the final review. Results Comparison of the classification of scenarios according to the learning objectives of adult health nursing and main category diseases found 25 matching scenarios. According to the analysis of measurement variables, 11 scenarios were able to evaluate all three domains of Bloom’s taxonomy. Conclusions When developing a standardized simulation scenario for students, it is necessary to consider the various learning objectives of adult health nursing, and to evaluate various areas extensively.

Subjects: Nurse Education & Management; Nurse Prescribing; Nurse Education & Management

Keywords: literature review; simulation training; nursing education; student; nursing

1. Introduction

The Korea Accreditation Board of Nursing Education (KABONE) conducted a certification evaluation to determine if nurses are sufficiently trained to fulfill their social responsibility and pursue their development (Korean Accreditation Board of Nursing Education (KABONE), 2017). In particular, as the importance of simulation operation is growing, it has been included in the practicum training criteria established by KABONE (2017).

Simulation allows nursing students to use their knowledge and skills in solving problems of complex situations to experience critical thinking (Lee, So, Kim, Kim, & An, 2014). Considering that more than 80% of those who need nursing care in Korea are adults (Song et al., 2011), standardizing simulations used in adult nursing education is considered a priority. Therefore, to universalize the application of simulation in a clinical situation (Yoo, 2015), it is necessary to develop and validate scenarios used with underlying theories, considering the limitations of each scenario (Waxman, 2010). To address this, the Korean Society of Adult Nursing established learning objectives for nursing students; these were presented with 10 major categories and 32 middle

PUBLIC INTEREST STATEMENT

Considering the flow of nursing, it is imperative to develop these scenarios according to the learning objectives of adult health nursing. This study can become a guide for this flow.
categories (Adult Nursing Society, 2016). These objectives should be reflected in developed scenarios for adult nursing. Therefore, a literature review that classifies and analyzes developed scenarios according to the learning objectives of adult health nursing should be performed to synthesize relevant information.

Kim, Park, and Shin (2013) systematically examined characteristics and results of studies on simulation-based education while Lee et al. (2014) analyzed the effect of high-fidelity patient simulation (HPS) on clinical performance ability and the level of self-confidence among nursing students. Additionally, Yoo (2015) reviewed the feasibility of implementing a domestic nursing-related simulation scenario in a developmental study while Park, Seo, Jeon, and Song (2016) studied the characteristics of a simulation training operation applied to nursing students in Korea. Studies such as these have focused on the operation and results of simulation education. However, a synthesis and review of scenarios used in simulation education has not yet been done.

Accordingly, this study classified literature on the development of simulation scenarios related to domestic adult nursing education for nursing students, according to the learning objectives of adult nursing. This was necessary to provide basic data for the development of a standardized adult nursing education simulation scenario. So, an integrative literature review was conducted to analyze scenarios and results used in adult nursing education.

This literature review synthesized results from studies on simulation scenarios. The benefit of this kind of review is that both experimental and qualitative research is included, allowing for a more comprehensive understanding of the concepts to be explored (Whittemore & Knafl, 2005). Although there have been a number of reports on simulation scenarios related to adult nursing education in Korea, most do not detail the content included in each scenario, making it impossible to confirm the specific context. Moreover, none of the research in question has examined the appropriateness of scenarios to meet the learning objectives of adult health nursing education in Korea. This study thus aimed to perform a literature review of studies on simulation scenarios utilized in adult health nursing.

2. Search strategy and review methods

In this study, theses and articles published in domestic journals related to the use of nursing simulation for nursing students were selected among papers published in Korea through July 2017. Databases used in this search included Korea Education and Research Information Service (KERIS), Assembly Library, Korea Studies Information Service System (KISS), DBpia, National Digital Science Library (NDSL), Korea Institute of Sciences and Technology Information (KISTI), Korean Medical Database (KMbase) and National Digital Library. “Simulation” and “nursing” were major search terms used when searching these databases. When operators could be used for each database, two researchers independently performed searches using “simulation AND nursing” search formula. Articles on nurses were excluded. The search was guided by the PRISMA statement was conducted in several databases (PRISMA, 2015).

The inclusion criteria used to select studies were as follows: First, the study was on nursing students (excluding nurses, health clinics, nursing officers, and so on). Second, the study developed simulation scenarios for adult health nursing area (excluding child nursing, maternal nursing, integrated subjects, and so on). Third, studies were research studies and intervention studies (simple technique evaluation, qualitative research, and simple BLS excluded) that conducted simulation training using standardized patients, simulators, and scenarios. Fourth, studies described simulation scenario in detail (excluding those with simple explanation of the situation, research published only in abstract, and preliminary research). The four authors examined all the studies in this review to determine the level of evidence based on the evidence table by Hira-RoB (Hira-Risk of Bias) (Health Insurance Review Assessment Service, 2011). For the selected 44 articles, bias evaluation was performed using Hira-RoB. Hira-RoB proposed a criterion to determine the risk of bias for eight domains: subject group comparability, selection of participants, confounding factor, measurement of intervention, blinding of outcome assessment, outcome evaluation, incomplete outcome
data, and selective outcome reporting. Finally, 26 articles (40 scenarios) were used for analysis after excluding 18 highly biased articles judged as ‘low’, “high”, and “uncertain” for each domain. The final selection process is shown in Figure 1.

General characteristics, simulation-related characteristics, measurement variables, and results of 26 articles (40 scenarios) selected for the study were analyzed. Published year, location, study design, sample size. Simulation-related characteristics such as scenario development, category of adult health nursing (Table 1), simulator type. This was conducted to analyze measurement variables and results of nursing education research, using simulation based on three domains (cognitive domain, affective domain, and psychomotor domain) of Bloom’s taxonomy (1959) of educational learning objective. Data are expressed as frequency and percentage. They were analyzed using Microsoft Office Excel 2007 program.

3. Search outcomes
All scenarios reported on studies conducted in a regional or remote area of South Korea, in Hira-RoB, were low-level. There was one group of pre-post test design (Kang, Kim, & Oh, 2013), one methodological study (Yang, 2016), and two randomized controlled pre-post test designs (Ha, 2014; Kim, 2015b). The remaining 22 studies used nonequivalent control group testing. The simulator was composed of seven standard patients (Kim, 2012b; Im, 2014; Jang, 2013; Jang & Roh, 2015; Kim & Kim, 2015; Lee, Park, & Noh, 2013; Yang, 2016), two patients not identified (Choi, Kwon, & Lee, 2013; Moon & Choe, 2016), and 16 HFP patients (high-fidelity patient simulator). Sample sizes ranged from 42 to 149 (Table 2).
4. Result

We analyzed linkages of scenarios presented in 26 selected studies of adult health nursing simulations according to the revised adult health nursing learning objective of August 2016 (Table 1). There were 40 scenarios presented in these 26 selected studies. Among them, 11 (27.5%) scenarios were strongly related to main category 1 "immune/body injury" (scenario no. 8.2; 8.3; 9.1; 10.3; 12.1; 12.2; 13.1; 17.1; 20.1; 25.1; 26.1) while 9 (22.50%) scenarios strongly linked to main category 7 "respiratory dysfunction" (scenario no. 1.1; 2.1; 2.2; 3.1; 4.1; 10.2; 14.1; 19.1; 24.1) the most common disease. However, no scenarios were linked to ingestion/absorption/metabolic disorder, activity/self-care disorder, or sensory dysfunction.

A more in-depth analysis revealed that out of the 11 scenarios associated with main category diseases, six emergency patient issues (scenario no. 9.1; 12.1; 12.2; 17.1; 20.1; 25.1) three skin integration disorders (scenario no. 8.2; 10.3; and 13.1); one surgery patient problem (scenario no. 26.1); and one immune abnormality (scenario no. 8.3) were relevant among the four diseased under immune/body injury category.

The 40 scenarios presented in 26 simulation studies related to adult health nursing were analyzed according to the main category diseases of adult health nursing revised in August 2016 (Table 2). When the classification according to the main category diseases in adult health nursing was compared to the classification according to the learning objectives of adult health nursing, there were 25 matching scenarios. However, 15 scenarios did not match (scenario no. 7.1; 9.1; 8.2; 8.3; 8.4; 10.1; 10.2; 10.3; 12.1; 12.2; 13.1; 19.1; 20.1; 22.1; 25.1).

After simulation operation, measured variables and results were classified into cognitive domain, affective domain, and psychomotor domain based on Bloom's taxonomy (1959). The results of the analysis are shown in Table 2. A total of 76 evaluation variables were found; only 2 (system thinking and interpersonal understanding) were not included in Bloom’s domain. There were 11

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Table 1. Classification according to the learning objectives of adult health nursing*

| Main categories                      | Middle categories                                                                 |
|--------------------------------------|-----------------------------------------------------------------------------------|
| I. Immune/body injury                | I-1. Skin integration disorder; I-2. Surgery patient problem;                      |
|                                       | I-3. Emergency Patient Issues; I-4. Immune abnormality                            |
| II. Change in comfort                | II-1. Ache; II-2. Fatigue; II-3. Pain; II-4. nausea/vomiting                      |
| III. Ingestion/absorption/metabolic  | III-1. Dysphagia; III-2. Digestive absorption disorder;                            |
| disorder                              | III-3. Bowel disorder; III-4. Nutritional imbalance                               |
| IV. Body fluid imbalance/urination    | IV-1. Fluid imbalance; IV-2. Electrolyte imbalance;                                |
| disorder                              | IV-3. Dysuria                                                                      |
| V. Activity/Disorder of self-care    | V-1. Mobility disorder; V-2. Disuse syndrome; V-3. Self-care disorder              |
| VI. Cardiovascular/hematologic       | VI-1. Activity intolerance; VI-2. Cardiac output reduction;                         |
| disorders                             | VI-3. Heart tissue perfusion disorder; VI-4. Peripheral tissue perfusion disorder;|
|                                       | VI-5. Blood disorder                                                              |
| VII. Respiratory dysfunction         | VII-1. Inefficient respiratory tract clean; VII-2. Ineffective gas exchange;      |
|                                       | VII-3. Ventilatory disorder                                                       |
| VIII. Neurocognitive dysfunction     | VIII-1. Cognitive dysfunction; VIII-2. Brain tissue perfusion disorder; VIII-3.   |
|                                       | Neur muscular disorders                                                           |
| XI. Dysregulation                    | XI-1. Endocrine control disorder                                                   |
| X. Sensory dysfunction               | X-1. Vision/visual impairment; X-2. Hearing/hearing impairment                    |

*Adapted from “Learning Objectives of Korean Journal of Adult Nursing." 1st revision in 2016. (Adapted with permission).
| Author          | Location    | Design                  | Sample Size | Result (Evaluation of Blood by Area)                                      | Scenarios                                | Main and Middle Categories (Connection with Core Diseases) |
|-----------------|-------------|-------------------------|-------------|--------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------|
| Ham, Y. L. (2009) | J city      | Non-equivalent control group pre–post quasi-experimental design (HPS) | 45 (23/22)  | The experimental group that experienced HPS showed higher critical thinking disposition and better problem-solving ability than the control group. (cognitive, affective) | 1.1 Nursing process of respiratory disorder | VII-3. Ventilatory disorder (linked)                       |
|                 |             |                         | 44 (22/22)  |                                                                           | 1.2 Nursing process of gastrointestinal disorder | II-1. Ache (linked)                                      |
|                 |             |                         |             |                                                                           | 1.3 Nursing process of cardiovascular disorder | VI-3. Heart tissue perfusion disorder (linked)           |
|                 |             |                         |             |                                                                           | 1.4 Nursing process of neurovascular disorder | VII-2. Brain tissue perfusion disorder (linked)          |
| Kim, C. S. (2012a) | Seoul      | Non-equivalent control group pre–post quasi-experimental design (HPS) | 41 (20/21)  | The experimental group that experienced HPS showed significantly better problem-solving ability than the control group. The skill performance and self-confidence improved in both groups after providing an educational program. (cognitive, psychomotor, affective) | 2.1 Nursing care for unplanned extubated patient using a patient simulator | VII-3. Ventilatory disorder (linked)                       |
|                 |             |                         |             |                                                                           | 2.2 Nursing care for ventilated patients in warning alarm of ventilator using a patient simulator | VII-2. Ineffective gas exchange (linked)                |

(Continued)
| Author          | Location in South Korea | Design (Simulator) | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area)                                                                 | Scenarios                        | Main and Middle Categories (Connection with Core Diseases) |
|-----------------|-------------------------|--------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------|
| Kim, H. R. (2012b) | Gwangju                | Non-equivalent control group pre–post quasi-experimental design (SP²) | 63 (32/31)                       | The experimental group that experienced the team-based simulation learning program showed better interpersonal understanding, problem-solving ability, and academic achievement scores than the control group. (cognitive, affective) | 3.1 Core for pneumonia patients and drug side effect | VII-2. Ineffective gas exchange (linked)                  |
| Ha, Y. K. & Koh, C. K. (2012) | M city                | Nonequivalent control group non-synchronized design (HPS) | 118 (60/58)                       | The intervention group showed significantly higher increases in clinical judgment and self-confidence than the control group. (cognitive, affective) | 4.1 Mechanical ventilation simulation | VII-2. Ineffective gas exchange (linked)                  |
| Kang, H. Y., Kim, E. J., & Oh, Y. J. (2013) | G city                | One group pre–post design (HPS) | 53                               | The learning satisfaction and problem-solving skills scores were improved after the simulation learning. (cognitive, affective) | 5.1 Care for patients with hyperkalemia of liver cirrhosis in emergency unit | IV-2. Electrolyte imbalance (linked)                      |
| Kweon, H. S. (2013) | G city                | A non-equivalent control group pre–post design (HPS) | 112 (56/56)                       | The group that experienced the nursing process simulation scenario showed significantly higher scores in record completeness, performance competency, and self-confidence than the group that experienced the complex case. (psychomotor, affective) | 6.1 Infection c diabetes | XI-1. Endocrine control disorder (linked)                  |
|                |                         |                    |                                   |                                                                                                      | 6.2 Acute pyelonephritis         | IV-1. Fluid imbalance (linked)                           |
| Author (Year) | Location in South Korea | Design (Simulator) | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area) | Scenarios | Main and Middle Categories (Connection with Core Diseases) |
|--------------|-------------------------|--------------------|-----------------------------------|------------------------------------|-----------|----------------------------------------------------------|
| Lee, S. J., Park, Y. M., & Nor, S. M. (2013) Low | Seoul | A non-equivalent control group pre-post design (SP) | 180 (96/84) | The treatment group showed significantly higher performance and self-confidence than the control group. The perceived helpfulness and contentment of the simulation training in experimental group was high. (psychomotor, affective) | 7.1 | Care for patients with urinary problems IV-3. Dysuria (not linked) |
| Jang, K. I. (2013) Low | Seoul | A non-equivalent control group pre-post design (SP) | 54 (25/29) | The experimental group with simulation education showed significantly higher satisfaction, nursing performance, and communication abilities than the control group. The mean differences of knowledge and self-confidence score between pretest and posttest was improved in both groups after the educational program. (cognitive, psychomotor, affective) | 8.1 | Pain management in oncology nursing II-1. Ache (linked) |
| Choi, E. H., Kwon, K.N., & Lee, E. J. (2013) Low | D city | A non-equivalent control group pre-post design (not identified) | 133 (32/33,34,34) | The experimental group with simulation education showed significantly higher subjective and objective knowledge and skill than the control group, but not objective attitude. (cognitive, psychomotor, affective) | 9.1 | Care for bleeding patients I-3. Emergency patient issues (not linked) |

(Continued)
| Author (Year) | Location in South Korea | Design (Simulator) | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area) | Scenarios | Main and Middle Categories (Connection with Core Diseases) |
|---------------|-------------------------|--------------------|------------------------------------|--------------------------------------|-----------|----------------------------------------------------------|
| Kim, S. K. (2014) Low | G city | A non-equivalent control group pre-post design (HPS) | 42 (21/21) | The experimental group showed significantly higher self-directed learning ability and clinical performance ability than the control group. (psychomotor, affective) | 10.1 | IV-3. Dysuria (not linked) |
| | | | | | 10.2 | VII-2. Ineffective gas exchange (not linked) |
| | | | | | 10.3 | I-1. Skin integration disorder (linked) |
| Im, K. J. (2014) Low | J city | Nonequivalent control group pre-post design quasi-experimental design (SP) | 82 (43/39) | The experimental group showed significantly higher clinical performance, critical thinking disposition, and clinical judgement than the control group. (cognitive, psychomotor) | 11.1 | IV-1. Fluid imbalance (linked) |
| Ha, Y. K. (2014) Low | Region of South Korea | Randomized (equivalent) control group pre-post design (HPS) | 52 (28/24) | The experimental group showed significantly higher level of clinical judgment than the control group, but knowledge and self-confidence did not differ significantly between the two groups. (cognitive, affective) | 12.1 | I-3. Emergency patient issues (not linked) |
| | | | | | 12.2 | I-3. Emergency patient issues (not linked) |

(Continued)
| Author          | Location       | Design                        | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area)                                                                 | Scenarios                                                                 | Main and Middle Categories (Connection with Core Diseases) |
|-----------------|----------------|-------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------|
| Han, Y.I. (2014)| U city         | Nonequivalent control group pre-post design (HPS) | 96 (48/48)                        | There were statistically significant differences in learning outcome and teaching experience effects of simulation-based education. (psychomotor, affective/except interpersonal understanding) | 13.1                                                                      | I-1. Skin integration disorder (not linked)                    |
| Kim, Y. H., (2015)| Seoul         | Comparative analysis study (HPS) | 117                               | The results of the study revealed that problem solving abilities after simulation practice were significantly greater than those after self-directed learning. (cognitive) | 14.1                                                                      | VII-3. Ventilatory disorder (linked)                           |
| Kim, H. Y. (2015)| Seoul         | Randomized(equivalent) control group pre-post design (HPS) | 67 (35/32)                        | The experimental group showed significantly higher on system thinking, problem solving ability and clinical competency skills than the control group. (cognitive, psychomotor/except system thinking) | 15.1                                                                      | VI-2. Cardiac output reduction (linked)                        |
| Kim, H. K. (2015)| G city         | Quasi-experimental nonequivalent control group pre-post design (HPS) | 80 (40/40)                        | The experimental group showed significantly higher clinical decision-making ability, clinical judgement ability, problem solving process, and confidence than the control group. (cognitive, affective) | 16.1                                                                      | VI-3. Heart tissue perfusion disorder (linked)                 |
| Author (Year) | Location in South Korea | Design (Simulator) | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area) | Scenarios | Main and Middle Categories (Connection with Core Diseases) |
|---------------|-------------------------|--------------------|-------------------------------------|-------------------------------------|----------|----------------------------------------------------------|
| Kim, H. Y. & Kim, H. R. (2015) Low | G city | Nonequivalent control group pre-post design (SP) | 149 (71/78) | Participants in the treatment group had significantly increased reported scores on both knowledge and clinical performance. (cognitive, psychomotor) | 17.1 | Colonoscopy indication, nursing before and after colonoscopy, emergency care for bleeding after colonoscopy |
| Song, I. H. (2015) Level low | Seoul | Nonequivalent control group pre-post design (HPS) | 60 (30/30) | The experimental group showed significantly higher on self-directed learning ability and self-confidence than the control group. (affective) | 18.1 | Hyperglycemia Patient Emergency nursing care |
| Jang, K. I. & Roh, Y. S. (2015) Low | Gyeonggi Province | Nonequivalent control group non-synchronized design (SP) | 64 (32/32) | The scores of the overall nursing performance ability and satisfaction in the experimental group were significantly higher than the control group. (psychomotor, affective) | 19.1 | Simulation-based Stroke Care Education |
| Jung, H. J. & Chae, M. J. (2015) Low | G city | Nonequivalent control group pre-post quasi-experimental design (HPS) | 60(30/30) | The self-confidence and clinical performance ability of the experiment group were significantly higher than the control group. (psychomotor, affective) | 20.1 | Cardiopulmonary arrest |
| Moon, J. E. & Chae, M. (2016) Low | G city | Nonequivalent pre-post of quasi-experimental design (not identified) | 60 (30/30) | The experimental group showed significantly higher scores in clinical performance and learning satisfaction than the control group. (psychomotor, affective) | 21.1 | Diabetic-hypoglycemia based simulation education |

(Continued)
| Author          | Location in South Korea | Design (Simulator) | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area)                                                                                   | Scenarios                      | Main and Middle Categories (Connection with Core Diseases) |
|-----------------|-------------------------|--------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------|
| Seo, Y. H. (2016) Low | J Province               | Nonequivalent control group pre-post quasi-experimental design (HPS) | 45 (25/20)                        | The experimental group showed significantly higher improvement in clinical reasoning ability, problem solving process and self-confidence than the control group. Also, the experimental group showed significantly higher scores in clinical competency. (cognitive, psychomotor, affective) | 22.1 Gastrointestinal bleeding | IV-1. Fluid imbalance (not linked)                        |
|                 |                         |                    |                                    |                                                                                                                        | 22.2 Acute myocardial infarction | VI-3. Heart tissue perfusion disorder (linked)             |
| Yang, H. M. (2016) Low | C city                  | Methodological study (SP) | 52 (25/27)                        | The standardized patient utilization group; the improvement of the pre and post communication skills; and the communication self-efficacy was found to be statistically improved, but the simple mannequin utilization group was not. (psychomotor, affective) | 23.1 Blood-sugar management of the inpatient diagnosed with the type 2 diabetes | XI-1. Endocrine control disorder (linked)                  |
|                 |                         |                    |                                    |                                                                                                                        | 23.2 Emergency situation of low blood sugar               | XI-1. Endocrine control disorder (linked)                  |
|                 |                         |                    |                                    |                                                                                                                        | 23.3 Nursing education after discharge                     | XI-1. Endocrine control disorder (linked)                  |
| Chae, M.J. (2016) Low | G city                  | Pre- post research design of nonequivalent control group (HPS) | 60 (30/30)                        | The experimental group showed significantly higher scores in learning attitude, problem solving process, and clinical performance than the control group. (cognitive, psychomotor, affective) | 24.1 Care for patients with acute asthma in emergency units | VII-3. Ventilatory disorder (linked)                      |
| Author (Year) | Location in South Korea | Design (Simulator) | Sample Size (Experimental/Control) | Result (Evaluation of Blood by Area) | Scenarios | Main and Middle Categories (Connection with Core Diseases) |
|---------------|------------------------|--------------------|-----------------------------------|--------------------------------------|-----------|-----------------------------------------------------|
| Chae, M.J., & Choi, S. H. (2016) Low | G city | Nonequivalent control group quasi-experimental design (HPS) | 60 (30/30) | Students in the experimental group scored significantly higher on knowledge, self-confidence, and clinical performance than students in the control group. (cognitive, psychomotor, affective) | 25.1 | Ventricular fibrillation and asystole situation I-3. Emergency patient issues (not linked) |
| Bang, S. Y. (2017) Low | C city | Nonequivalent control group non-synchronized design (HPS) | 70 (34/36) | The experimental group showed significantly higher on critical thinking, self-efficacy and clinical judgment (cognition area, interpretation area, response area, reflection area) than the control group. (cognitive, affective) | 26.1 | Patient care after abdominal surgery I-2. Surgery patient problem (not linked) |

*HPS: High-fidelity patient simulator

*SP: Standard patient
scenarios that were evaluated using all three domains of Bloom’s taxonomy (scenario no. 2.1; 2.2; 8.1; 8.2; 8.3; 8.4; 9.1; 22.1; 22.2; 24.1; 25.1) (Kim, 2012a; Lee et al., 2013; Choi et al., 2013). Twenty-seven scenarios used two domains, while two scenarios (scenario no. 14.1; 18.1) used only one domain (Kim et al., 2015; Song, 2015).

5. Discussion
This study conducted a literature review of simulation scenarios related to adult health nursing for nursing students in Korea. Simulation scenarios were analyzed according to the learning objectives of adult health nursing and its main category of diseases. Among the 32 middle categories of all adult health nursing learning objectives, 17 areas were not linked to or associated with scenarios developed while 6 areas only had 1 relevant scenario (Kim & Choi, 2008; Kim & Jang, 2011). However, the development of scenarios in other areas is insufficient. There are no existing articles that developed scenarios in accordance with the learning objectives of adult health nursing education as domestic simulation studies focused on educational programs and operating methods, which can lead to effective learning outcomes (Eom, Kim, Kim, & Seong, 2010; Kim & Jang, 2011; Kim et al., 2013; Lee et al., 2014; Park et al., 2016).

As the actual clinic site is categorized by patient’s disease, the nursing care tailored for the patient is very important. The concordance rate of main category diseases was highest for respiratory diseases (asthma, chronic obstructive pulmonary disease, and acute respiratory distress syndrome) followed by that for cardiovascular diseases (myocardial infarction and endocrine diseases such as diabetes). In previous studies, respiratory, circulatory, and endocrine diseases, specifically diabetes, were the most common scenarios (Kim et al., 2013; Lee, Kim, & Oh, 2011; Lim, 2011). These diseases were thus consistent with the learning objectives. However, neurological diseases such as stroke were inconsistent with the main category of diseases, with only one being consistent in the scenario. Other problems that may arise in stroke patients seem to be centered on dysphagia, disuse syndrome, self-care disorder, and neurocognitive dysfunction rather than nursing problems, due to typical symptoms. It is important to address unexpected nursing problems that may be encountered in the clinic, rather than nursing problems associated with the disease itself. Therefore, future simulation education in nursing will need to focus on the nursing process for the patient rather than the medical conditions.

To analyze measurement variables of adult health nursing studies, clinical performance (affective domain), problem-solving ability (cognitive domain), and confidence and satisfaction (psychomotor domain) were measured. All three factors increased after the simulation. Based on the Jeffries simulation model (Jeffries, 2005), simulation training mainly evaluates clinical performance ability, nursing knowledge, problem-solving ability, satisfaction, confidence, and critical tendency (Yoo, 2015).

However, among the 26 studies in total, only 6 evaluated all 3 domains that Bloom proposed, while the others measured only 1 or 2 domains. Using Bloom’s three domains to classify measured variables requires an integrated manner of evaluation (Shin, Park, & Shim, 2014), especially as simulation expects nursing students to experience critical thinking through debriefing (Lee et al., 2014). Among measured variables, there were no statistically significant differences in three variables of knowledge, two variables of critical thinking and tendency, and two variables of confidence. This was partially consistent with the existing literature and review study (Kim et al., 2013; Lim, 2011). Similarly, it was reported that it is difficult to verify the potential effects of simulations through short-term studies and that it is difficult for variables to change through short-term education (Kim et al., 2013). In future interventional simulation studies, measuring variables to enable a balanced assessment on defining, cognitive, and psychomotor domains should be selected, as suggested by Jeffries (Jeffries, 2005).

Although studies on simulation-based education are becoming increasingly popular, the present study’s methods set it apart as it screened the results and contents of simulation scenarios related to adult health nursing through quality evaluation. Moreover, the scenarios were analyzed...
according to the updated learning objectives of adult health nursing education. This study is meaningful in that it provides implications for the development of simulation scenarios for adult health nursing in the future. However, it is difficult to generalize its results as only studies that extensively described the simulation scenarios used were selected. It cannot measure the readiness of the instructor in relation to the operating parameters of the simulation scenario. There is also a lack of a concrete method of debriefing, which can also be a limitation.

6. Conclusion
In recent years, simulation education has become more relevant. Universal standards for simulation scenarios related to adult health nursing are needed. However, in Korea, simulation scenarios are categorized irrespective of the learning objectives of adult health nursing. There is a lack of a literature review of simulation scenarios. This study attempted to fill this gap by reviewing the results of previous studies on the development of simulation scenarios adhering to the learning objectives of adult health nursing. Results showed that while several studies on simulation scenarios related to adult health nursing exist, they concentrated on one area rather than encompassing all of the learning objectives of adult health nursing. Moreover, this study confirmed that the classification according to the learning objectives of adult health nursing and the classification based on diseases were inconsistent. Finally, most studies were not able to evaluate the scenarios using the three domains of Bloom’s taxonomy. Therefore, when developing a standardized simulation scenario for students, it is necessary to consider the various learning objectives of adult nursing, and to evaluate all areas extensively.

In the future, these findings can become a guide in creating simulation scenarios for nursing students; it highlights the importance of a properly developed scenario in a simulation operation. Considering that the nursing field is rapidly changing, it is imperative to develop these scenarios according to the learning objectives of all areas of adult health nursing to nurture competent nurses.

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Author contribution
A. R. J. and I. G. L. contributed to the conception and design of this study; H. N. C. performed statistical analysis and drafted the manuscript; A. R. J. critically reviewed the manuscript and supervised the whole study process. All authors read and approved the final manuscript.

Author statement
This study synthesized literature on simulation scenarios according to adult health nursing learning objectives. These results can be the basis for a standardized scenario.

Data availability statement
Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclosure statement
No potential conflict of interest was reported by the authors.

Geolocation information
Country: Republic of Korea
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Impact statement
The present study will contribute to the qualitative improvement of simulation through identifying the development of simulation scenario for adults in Korea.

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