Effect of Simulation Based-Learning on Improving Cognitive Achievement of Nursing Students during Care of Patients with Bronchial Asthma

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ABSTRACT

Background: Simulation provides students with the opportunity to improve their intended learning outcomes such as clinical performance, knowledge acquisition, clinical reasoning and student satisfaction. **The aim** of this study was to investigate the effect of simulation based learning on improving cognitive achievement of nursing students during care of patients with bronchial asthma. A quasi-experimental design was used in this study on 100 nursing students at Medical surgical Nursing simulations Lab in Faculty of Nursing, Beni-Suef University. **Four tools** were used: cognitive achievement tool, Students' practice observational checklist, Simulation Effectiveness Tool and perceived competence scales. **Results** showed that there was a statistical significant difference between the nursing students' level of knowledge before and after application of simulation（p<0.001**) and showed that simulation based learning group showed the highest scores in practice compared to groups using traditional methods alone. **Conclusion:** the level of nursing students' knowledge and practice were generally improved after application of simulation based learning strategy about bronchial asthma. The simulation based learning has a significant influence in improving the cognitive abilities of nursing students in practicing nursing care in the case of patients with bronchial asthma, compared to face-to-face lectures. **Recommendations:** Nursing education programs should adopt and support the introduction of simulation in undergraduate education and curriculum development.

Keywords: Simulation Based Learning, Cognitive Achievement, Nursing Students, Asthma

Introduction

Clinical nursing education strives to assist students enhance their problem-solving skills by integrating theoretical knowledge from books into practical knowledge in real-life scenarios. Simulation is an effective educational tool that involves nursing students and needs critical thinking and clinical reasoning, as well as opportunities for reflection and information integration. It appears to be an important component of nursing education, as it boosts students' confidence in all areas of learning, including intellectual, affective, and psychomotor skills. **(Abd Elfattah et al., 2019; Walters Linda, 2014).** Static mannequins, role-plays, and cardiopulmonary resuscitation (CPR) mannequins have all been utilized in nursing education as teaching tools. Fidelity simulation, which uses high-tech simulation monitors and computers, is a relatively new aspect of nursing education. **(Levine and colleagues, 2014)**

Asthma impacted roughly 262 million individuals globally in 2019, with 461,000 people dying as a result of the disease. Rates vary by country, with prevalence ranging from 1% to 18%, and this incidence has been rising as a result of recent environmental air pollution. Asthma is a chronic inflammatory illness of the airways marked by bronchial hyperactivity and variable airway blockage, resulting in recurring episodes of wheezing, dyspnea, chest tightness, and coughing that vary in frequency and intensity over time. Asthma is not only a short-term but also a long-term condition that necessitates precise treatment and ongoing maintenance, and if not correctly managed, it can lead to hospitalization. Therefore,

early awareness and coping ability are considered important. For nursing students, simulation based learning may improve the nursing practice of caring for patients with asthma through repetitive learning. **(Korean Academy of Pediatric Allergy and Respiratory Disease, 2020 and Mutius , Drazen 2012)**.

Not merely handling mannequins, simulation-based nursing education encompasses a wide range of activities using patient simulators, including technology, trained people, lifelike virtual settings, and role-playing. Simulation-based educational interventions in nursing can train novice and experienced nurses by using realistic clinical scenarios to assist them develop effective non-technical skills, rehearse rare emergency circumstances, and provide a variety of true life-threatening events. The ability to provide immediate feedback, repetitive practice learning, integration of simulation into the curriculum, the ability to adjust the difficulty level, opportunities to individualize learning, and adaptability to various types of learning strategies are all advantages of simulation-based educational interventions **(Albertson, 2012).**

From low-fidelity simulation (LFS) to high-fidelity simulation (HFS), simulation can be defined as a continuum (HFS). Different simulation approaches can be customized to meet various learning objectives and educational levels (Wan & Lam, 2019). Nursing students can be guided to thoroughly gain knowledge and abilities in difficult clinical circumstances by using sophisticated technologies such as simulation-based learning. It also enhances active learning,

involvement, and communication among students. (**Lewiset et al., 2012; Jarvis & Saman, 2017; Durham & Alden, 2018; Silva et al., 2019**).

Currently, nursing teachers have tended to apply simulation instead of conventional techniques to boom satisfaction, self-efficacy, and students self-belief. Most newly graduated nurses must have specified abilities to carry out psychomotor procedures**.** Therefore, simulations improve basic nursing skills (**Morfoot & Stanley 2018, and Myer &Chen 2019).** Errors in the real clinical environment endanger patient safety. For this reason, nursing students need to consistently perform primary nursing interventions in the laboratory. The simulation recreates a real-life situation where nursing students can gain clinical experience without endangering the patient health environment. (**Galbraith, 2015, Almousa et al., 2019 and Andersen et al., 2019).**

Significance of the Problem

Due to lack of chances in clinical practice during student learning, rapid changes in clinical placements, patient safety issues, and ethical concerns, students' direct experience with patient care and opportunities to handle problem-based clinical situations have been diminished. Simulation-based clinical education is a useful pedagogical approach that provides nursing students with opportunities to practice their clinical and decision-making skills through varied real-life situational experiences, without compromising the patient's well-being and made simulation a necessary part of nursing courses. Simulation-based learning methods have been introduced and

replacing maintenance with hospital-based clinical training. Therefore, the impact of simulation-based learning needs to be studied in order to understand its impact on nursing and its potential challenges for future clinical education. (**Foronda et al., 2013 and Khattar, et al., 2020**).

Determining the current state of knowledge regarding evaluation of simulation in nursing is necessary for educators to improve research methods, educational efforts and student outcomes. (**Foronda et al., 2013**).In Egypt there is a study conducted by Gamal El-deen et al., (2015) found that there was statistically significant difference in students' knowledge and performance after simulation-based learning (SBL).

Aim of the study

The purpose was to investigate the effect of simulation-based learning on improving cognitive achievement of nursing students during care of patient with bronchial asthma. This study seeks to determine the difference in simulated learning effects in performance between two groups of (a) knowledge and (b) and (c) nursing students' practice before and after the intervention.

Research hypothesis

Nursing students in simulation group will demonstrate improving on cognitive achievement compared to nursing students using only traditional methods of learning.

Subjects and Method

Study Design

The present study was use a quasi-experimental design with pre and post-test on the study and control group.

Study Setting:

The study was conducted at Medical surgical Nursing simulations Lab in Faculty of Nursing, Beni-Suef University, Egypt.

Study Subjects

Sampling technique

The total number of respondents was 100 respondents. The researchers used purposive sampling technique on selecting study group and control group in the study because they were fulfilled the study criteria as; they were undergraduate nursing students in the faculty of nursing, who had passed the basic concepts of nursing and, had never attended medical surgical nursing course.

The respondents were divided into two groups randomly, namely traditional teaching method group which was the control group, and Simulation group as the intervention group. The study subjects consisted of two groups of undergraduate nursing students at second year in the first semester during the academic year 2020-2021.

1- Simulation group (intervention group) consisted of 50 students who learned through using simulation scenario.

2- Traditional teaching method group (Control group) consisted of 50 students who learned through using only the traditional method (lecture method).The two groups received pre-post knowledge test to evaluate the cognitive abilities of the studied students.

Data collection tools: four tools were developed by the researchers to collect the data of this study for data collection**. These tools include the following:**

Tool one: cognitive achievement tool which consisted from two parts regarding knowledge and practice.

Part one: Demographic Questionnaire: Demographic data were collected to describe the sample and compare demographic characteristics to study outcomes. A demographic questionnaire was included student name, age, sex, residents and academic achievement for previous year.

Part two Knowledge

The knowledge scale of nursing care for patient with asthma was developed considering learning objectives by the researchers. This tool used to assess the baseline nursing students' knowledge regarding bronchial asthma. Two types of questions were used; multiple choice questions and true /false questions. This tool consisted of 16 questions regarding definition, causes, risk factors, types, signs and symptoms, pathophysiology, diagnostic evaluation, complication, medical management and nursing care of bronchial asthma.

Scoring system: The score of each question was assigned as follows: Correct answer = score one and Incorrect answer = score zero. The cut point for higher scores > 75% indicate a higher level of knowledge and low score less than 75% indicate a low level of knowledge.

Tool two: Students' practice observational checklist for assessment and nursing intervention of bronchial asthma:

This tool was developed by the researchers after reviewing the related literature. (Durham & Alden 2018, Silva et al., 2019). It used to assess the baseline nursing students' skills regarding bronchial asthma by using human patient

simulation. It consists of four items namely; Patient-nurse relationship, symptom recognition, assessment, and nursing interventions of bronchial asthma.

Scoring system: score for each item was assigned as follows:

Correct steps: perform the step according to the standard procedure or guidelines equal score one

Not Done: step or skill not performed equal score zero

Tool three: Simulation Effectiveness Tool – Modified or SET-M

Simulation Effectiveness Tool – Modified or SET-M was developed by. **(Leighton, K., Ravert, P., Mudra, V., & Macintosh, C.(2015)**. Update the Simulation Effectiveness Tool: Item modifications and reevaluation of psychometric properties and used for evaluating students' perceptions of the effectiveness of learning in the simulation environment**.** The four factors identified were prebriefing, learning, confidence and debriefing.

Tool four: perceived competence scales

The Perceived Competence Scale (PCS) is a short, 4-item questionnaire, and it assesses participants' feelings of competence about, say, taking a particular college course, engaging in a healthier behavior, participating in a physical activity regularly, or following through on some commitment. **Williams & Deci (1996).**

Method

The study was accomplished through the following steps:

1. Administrative process: An official permission to conduct the study was obtained from Dean Faculty of Nursing and Head of medical and surgical nursing department Beni-Suef University, to conduct this study after explanation the purpose of the study.

2-Ethical Consideration

The research proposal was approved from ethical committee in the Faculty of Nursing, Beni-Suef University. There was no risk for study subject during application of research, The study followed the common ethical principles in clinical research, Informed consent was obtained from participants that were participated in the study after explaining the nature and purpose of the study, Confidentiality and anonymity was assured and study participants have the right to refuse to participate or withdraw from the study.

3. Pilot study:-

A pilot study was carried out on 10% of the study sample to test clarity and applicability of the study tools then the necessary modification was done. The pilot study was excluded from the study sample.

4- Validity and Reliability of the tools: Data collecting tools reviewed by expertise panel from five experts in the fields of medical surgical, community health, psychiatric nursing, and nursing administration. According to their judgments on clarified sentence and appropriateness contents, the necessary modifications were done accordingly. Cronbach's alpha coefficient calculating for reliability assessment and each tool consisted as relatively
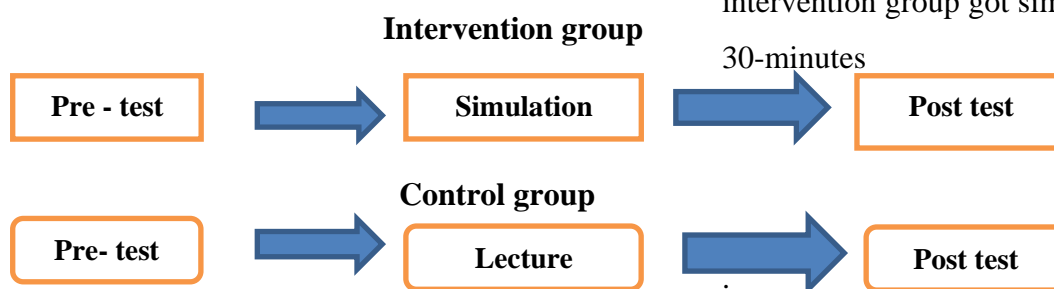
homogenous items. The internal consistency of knowledge was 0.856; the internal consistency of practice was 0.869. Internal consistency of self-efficacy was 0.879. Cronbach's alpha was used to measure the reliability of the Simulation Effectiveness Tool – Modified or SET-M which it was 0.94

5- Time of data collection: The data was collected over a period of three months from October to December 2020. Four tools were used in this study.

6- Data collection

The current study was carried out on four phases; assessment, preparation, implementation and evaluation phases.

Diagram1. The flow of data collection

Intervention group

| Pre - test | → | Simulation | → | Post test |

Control group

| Pre- test | → | Lecture | → | Post test |

1-Assessment phase: Before using the application, two groups were asked to do a pre-test.

- Assessment of the baseline nursing students' knowledge regarding to bronchial asthma was done using pretest tool I part two.
- Assessment of the baseline nursing students' performance done using pretest "Performance checklist for assessment and nursing intervention of bronchial asthma tool two.

2- Preparation phase: lecture and scenario case about bronchial asthma was developed by the researcher based on reviewing the related literature (Lewis & Strachan 2012 and Silva et al 2019).

☐ The theoretical contents was focus on; lecture about definitions causes, risk factors, types clinical features, pathophysiology, diagnosis, complication, medical management and nursing intervention of bronchial asthma .

☐ The practical content was focus on scenario case about assessment and nursing intervention of bronchial asthma.

3- Implementation phase:

Then, intervention is treated based on a different group, where the control group got a 60-minutes lecture about bronchial asthma, while the intervention group got simulation session for about 30-minutes

Procedures

Traditional teaching Group (control group)

Data collection and clinical education were conducted from October to December 2020. During this period, owing to COVID−19, face-to-face lectures were conducted in small groups of less than 25 students. Prior to the lectures and practice, students agreed and signed up for small face-to-face lectures. All participants and researchers followed the guidelines provided by World Health Organization for COVID−19 infection control (checking temperature, washing hands with soap, wearing masks, and social

distancing). Firstly, the pre-test was conducted before the lecture, and subsequently, the lecture about nursing care for patient with bronchial asthma was conducted for approximately 60 min. Educational content in the lecture focused on assessing pathophysiological mechanisms, related diagnostics, nursing care, and education for both patients and family caregivers. Then Students in the control group were divided in to five equal groups. Each group contained 10 students. Different methods of teaching were used including lectures and power point for the control group

Simulation-based learning (study group)

Firstly: lecture about definitions causes, risk factors, types, clinical features, pathophysiology, diagnosis, complication, medical management and nursing intervention of bronchial asthma was conducted. Then Students' in the study group were divided in to five equal groups. Each group contained 10 students. Students in the study group were subject to educational simulation which of respiratory assessment of the patient with mild intermittent asthma who visited the emergency room, identification of mild respiratory difficulties, administration of drugs according to the doctor's orders, and education regarding asthma prevention and treatment. The simulation was conducted in three sessions in the simulation laboratory, two per week. The time of each session was about 30 minutes. Different methods of teaching were used including lectures and power point, demonstration and redemonstration, illustrative pictures, real videos, simulation and handouts for study group. For practical contents:

Implementation phase for simulation based learning group:

1- Pre simulation student preparation:

Instructions to the each subgroup of students should be:

☐ proceeding to simulation, complete assigned readings, case scenario.

☐ Prompt to your assigned simulation time.

☐ Address and treat mannequin as though a patient.

2-Presimulation briefing: Each subgroup of students is oriented to the mannequin and the learning environment. Then given case scenario included written clinically based patients' information related to bronchial asthma, physical examination, diagnostic test and medical management with some incomplete, uncertain or insufficient information to better reflecting the reality of clinical practice. Students are encouraged to uncover and examine and touch the mannequin, listen to the breath sounds, assess the chest, measure vital signs, skin color and ECG. The voice of the mannequin is demonstrated. It is important to remind students that they are to treat the mannequin as they would a patient in the scenario.

3- Intrasimulation: Student in each subgroup were asked to assess, begin primary intervention for chest pain, placed patient in semi fowlers position, assess vital signs and chest status and maintain , establish an IV access route, administer medications as prescribed, and apply oxygen therapy.

4-Postsimulation: The researchers debriefing the simulation to correct any misinformation or

improper practice techniques the students may demonstrate.

4- Evaluation phase: At the end of the intervention, a post-test was conducted for all groups. The researchers started the evaluation phase at the end of re-demonstration for all students in the study and control groups. Observation was done for each required procedure using tool two. Knowledge for each student was reassessed using tool one.
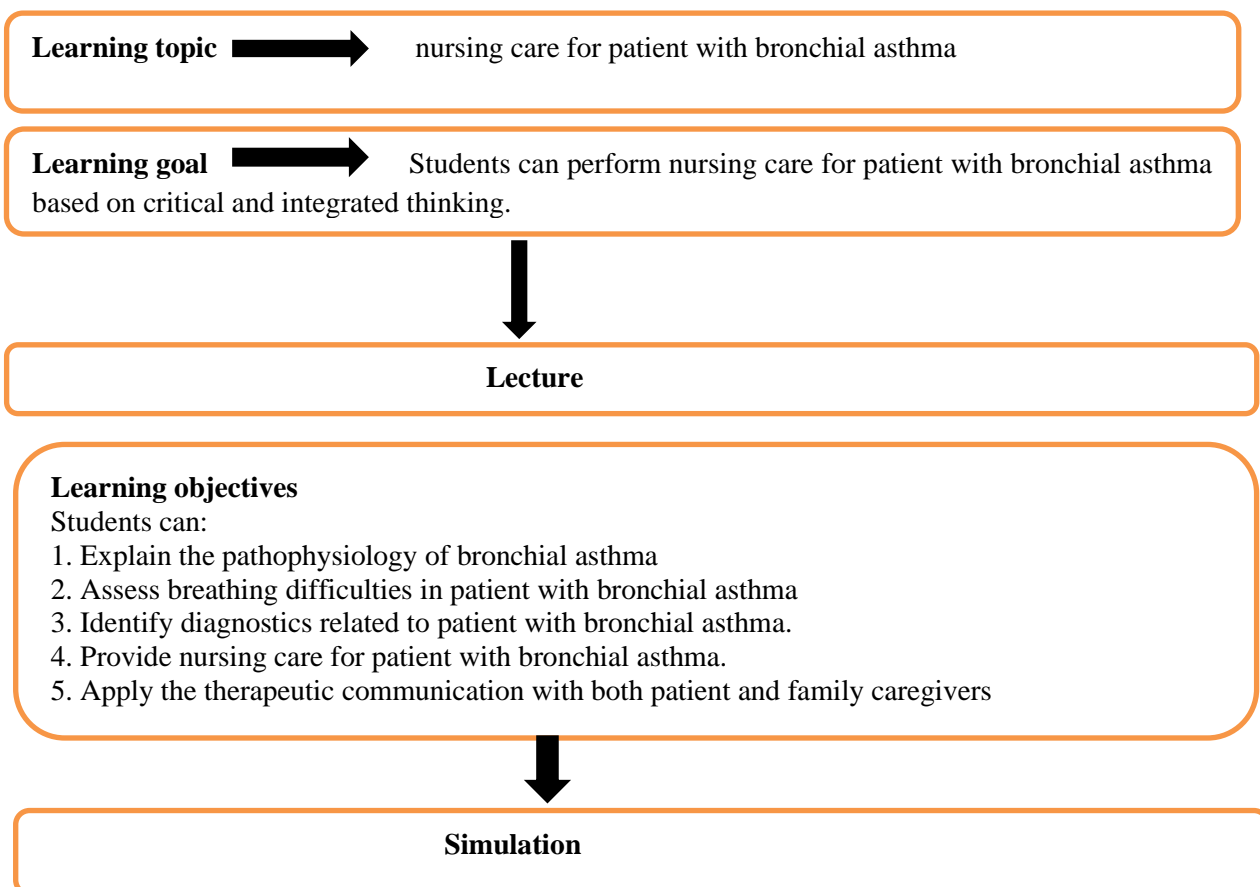
Statistical design:

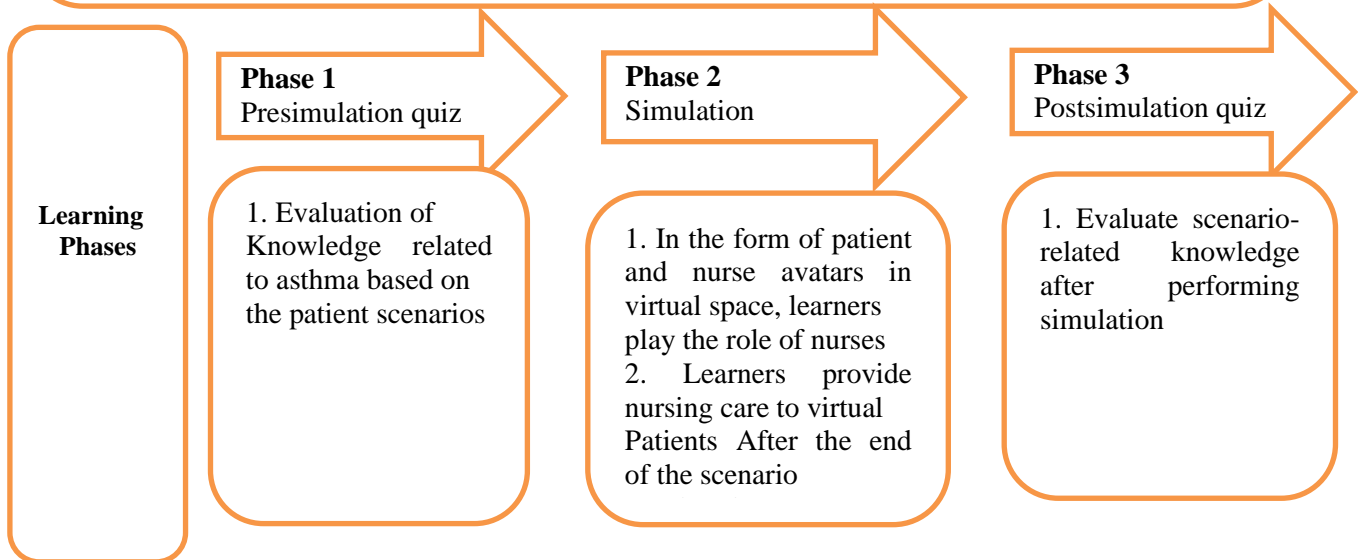Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). Data were presented as number, percentage, mean, standard deviation. Chi-square test and was used to compare qualitative variables. An independent sample t-test was used to compare quantitative variables between two groups. Paired samples t-test was used to compare quantitative variables between pre-test and post-test. Pearson correlation was done to measure correlation between quantitative variables. P-value considered statistically significant when $P < 0.05$.

Diagram 2: The flow of educational intervention for simulation-based learning group

Learning topic ➡ nursing care for patient with bronchial asthma

Learning goal ➡ Students can perform nursing care for patient with bronchial asthma based on critical and integrated thinking.

Lecture

Learning objectives
Students can:
1. Explain the pathophysiology of bronchial asthma
2. Assess breathing difficulties in patient with bronchial asthma
3. Identify diagnostics related to patient with bronchial asthma.
4. Provide nursing care for patient with bronchial asthma.
5. Apply the therapeutic communication with both patient and family caregivers

Simulation

Patient information

Sara Ali is a 55-year-old being seen in the chest clinic today for breathing problems. She has a history of bronchial asthma but is otherwise healthy. She was seen in the clinic once before for a health supervision visit. Her asthma was well controlled and medications were renewed. The family moved here from rural to urban area two years ago. Patient Data: Female age 55 years/ Weight 59 kg/ Height 155 cm/ Allergies: No known/ Past Medical History: Sara was diagnosed with bronchial asthma since 3 years ago She gets a lot of colds in the winter and as a diabetic patient had multiple chest infections.

Learning Phases

Phase 1
Presimulation quiz

1. Evaluation of Knowledge related to asthma based on the patient scenarios

Phase 2
Simulation

1. In the form of patient and nurse avatars in virtual space, learners play the role of nurses
2. Learners provide nursing care to virtual Patients After the end of the scenario

Phase 3
Postsimulation quiz

1. Evaluate scenario-related knowledge after performing simulation

Results

Table (1): Distribution of the studied sample according to their Personal data

Personal data of studied students: it clears that (68.0% and 64.0%) of the control and study group respectively within the age group from 18-20 years old. In relation to sex, the table revealed that 60.0 % of students in the study and control group were females As regards to academic achievement for previous year (36% and 40%) from control and study group respectively got a very good appreciation.

Table (2): Denotes the total mean score of Knowledge about bronchial asthma among control and study group. It was observed that there are statistical significant differences between the nursing students' level of knowledge before and after application of teaching program in relation to definition, etiology ,assessment, diagnostic evaluation , medical , nursing intervention and complication of bronchial asthma (p<0.001**).

Table (3): Presents the distribution of studied sample practice regarding to nursing intervention for patient with bronchial asthma. It was observed that there are statistical significant differences between the control and study students' practice in relation to assessment, nursing intervention discharge teaching, diagnostic tests of bronchial asthma and so on.

Table (4): Clarifies the mean score of Perceived competence for learning scale among control and study group, there was statistical significant difference in all statements related to Perceived competence scale among studied sample (control and study group).

Table (5): Shows distribution of the studied simulation group regarding to simulation effectiveness tool (Modified SET-M) it was demonstrated that 78% strongly agree with statement of Pre-briefing was beneficial to my learning. Also; during Scenario the majority of them strongly agree with statement revealed that "I am more confident in my ability to pritorize care and intervention", In Debriefing 80 % of them strongly agree with statement stated that "Debriefing was valuable in helping me improve my clinical judgment"

Table (6): Clears the mean score of the studied sample regarding to management and nursing intervention for bronchial asthma after different teaching methods used From this table, it can be noted that there were statistical significant differences among control and study group after application of different teaching methods in relation to management, nursing intervention, nursing professional behaviors and Skill competencies

Table (7): Describes relation between personal characteristics and mean score of knowledge in pre and posttest among simulation group It was observed that there are no statistical significant differences between mean sore of study group in pre / posttest and age and sex while there were statistical significant difference with academic

achievement of previous year in area of pretest only.

Table (8): Clarifies relation between personal characteristics and mean score of management and nursing intervention in posttest among study group. It clears that there was statistical significant difference between some personal characteristics as (academic achievement for previous year and knowledge related to management & nursing intervention.

Figure (1): Illustrates the total means score of Knowledge about bronchial asthma among Control and Study group. It was cleared that there was statistical significant difference in studied sample knowledge in pre and posttest among control and study group.

Figure (2): Illustrates correlation between knowledge score and management and nursing intervention among simulation group. From this figure it can be noted that there was statically significant correlation between knowledge score and management & nursing intervention (p= 0.019*).

Figure (3): Highlights the correlation between knowledge score and practice among simulation group. It noted that there was statically significant correlation between knowledge score and skills evaluation (p=0.035*).

Table (1): Distribution of the studied sample according to their Personal data

Personal data	Control group (n= 50)		Study group (n= 50)		P-value
	No.	%	No.	%	
Age: (years)					
18 – 20	34	68.0%	32	64.0%	0.673
> 20	16	32.0%	18	36.0%	
Sex:					
Male	20	40.0%	20	40.0%	1.000
Female	30	60.0%	30	60.0%	
Academic achievement for previous year:					
Excellent	15	30.0%	13	26.0%	
Very good	18	36.0%	20	40.0%	0.969
Good	9	18.0%	9	18.0%	
Pass	8	16.0%	8	16.0%	

Table (2): Total mean score of Knowledge about bronchial asthma among control and study group

Knowledge score	Control group (n= 50)	Study group (n= 50)	P-value[1]
	Mean ± SD	Mean ± SD	
Pre-test	4.30 ± 1.51	5.90 ± 2.15	0.102
Post-test	21.80 ± 5.61	45.24 ± 5.67	0.000*
P-value[2]	0.000*	0.000*	

Table (3): Distribution of studied sample practice regarding to nursing intervention for patient with bronchial asthma

Items	control group				Study group				P-value
	Done		Not done		Done		Not done		
	No.	%	No.	%	No.	%	No.	%	
Assessment:									
Obtains vital signs	23	46.0	27	54.0	44	88.0	6	12.0	0.000*
Performs a focused respiratory assessment	14	28.0	36	72.0	50	100.0	0	0.0	0.000*
Identifies respiratory distress (through Auscultation of heart and lung sounds).	14	28.0	36	72.0	43	86.0	7	14.0	0.000*
Evaluates peak flow readings	0	0.0	50	100.0	34	68.0	16	32.0	0.000*
Evaluates oxygenation status	6	12.0	44	88.0	46	92.0	4	8.0	0.000*
Nursing intervention:									
Applies oxygen and adjusts its flow	13	26.0	37	74.0	50	100.0	0	0.0	0.000*
Obtains peak flow reading	4	8.0	46	92.0	42	84.0	8	16.0	0.000*
Administers medications following the Six Rights	39	78.0	11	22.0	50	100.0	0	0.0	0.000*
Instructing patient/family on the use of metered Dose Inhaler (MDI) with spacer, Peak Flow Meter	1	2.0	49	98.0	40	80.0	10	20.0	0.000*
Focused respiratory assessment, hanging a Piggy Back.	0	0.0	50	100.0	36	72.0	14	28.0	0.000*
Health teaching regarding giving corticosteroids:									
Administer with meals to reduce gastrointestinal irritation	10	20.0	40	80.0	50	100.0	0	0.0	0.000*
Adhere to prescribed dosage regimen	17	34.0	33	66.0	42	84.0	8	16.0	0.000*
Do not omit, increase or decrease dose	8	16.0	42	84.0	42	84.0	8	16.0	0.000*
Hazards of long term of corticosteroid uses	18	36.0	32	64.0	47	94.0	3	6.0	0.000*

Conti. Table (3)

Discharge teaching:									
When to seek medical help	19	38.0	31	62.0	47	94.0	3	6.0	0.000*
How to use the peak flow meter	2	4.0	48	96.0	45	90.0	5	10.0	0.000*
Medication regimen	8	16.0	42	84.0	43	86.0	7	14.0	0.000*
Avoidance of triggers What are the priority interventions for this patient?	23	46.0	27	54.0	50	100.0	0	0.0	0.000*
Place stretcher in high Fowler's position	12	24.0	38	76.0	48	96.0	2	4.0	0.000*
Attach to cardiac monitor with pulse oxymeter	11	22.0	39	78.0	50	100.0	0	0.0	0.000*
Respiratory assessment:	21	42.0	29	58.0	50	100.0	0	0.0	0.000*
Optimize environmental controls	23	46.0	27	54.0	50	100.0	0	0.0	0.000*
Recognize asthma signs and symptoms	23	46.0	27	54.0	50	100.0	0	0.0	0.000*
Stress the importance of smoking cessation	35	70.0	15	30.0	48	96.0	2	4.0	0.001*
Communicate effectively with all participants in this, including family members and other health care professionals:									
Notifies healthcare provider of assessment findings	26	52.0	24	48.0	46	92.0	4	8.0	0.000*
Provides age-appropriate communication and reassurance to patient	39	78.0	11	22.0	48	96.0	2	4.0	0.007*
Provides reassurance to patients	41	82.0	9	18.0	46	92.0	4	8.0	0.137
Interpret diagnostic tests associated with asthma:									
Diagnostic tests for asthma:									
Forced vital capacity parameters	2	4.0	48	96.0	42	84.0	8	16.0	0.000*
Arterial blood gas analysis	25	50.0	25	50.0	50	100.0	0	0.0	0.000*
Transcutaneous oxygen saturation values	9	18.0	41	82.0	50	100.0	0	0.0	0.000*
Peak flow comparative analysis	2	4.0	48	96.0	43	86.0	7	14.0	0.000*

Table (4): Mean score of Perceived competence for learning scale among control and study group

Items	control group (n= 50)	Study group (n= 50)	P-value
I feel confident in my ability to learn this material:			
Mean ± SD	3.82 ± 0.80	6.68 ± 0.62	0.000*
Range	2.0-7.0	5.0-7.0	
I am capable of learning the material in this course:			
Mean ± SD	3.88 ± 1.21	6.40 ± 0.76	0.000*
Range	2.0-7.0	4.0-7.0	
I am able to achieve my goals in this course:			
Mean ± SD	3.52 ± 0.91	6.46 ± 0.76	0.000*
Range	2.0-7.0	4.0-7.0	
I feel able to meet the challenge of performing well in this course:			
Mean ± SD	4.08 ± 1.01	6.18 ± 1.04	0.000*
Range	2.0-7.0	4.0-7.0	
Perceived competence for bronchial asthma:			
Mean ± SD	2.61 ± 0.82	5.42 ± 0.94	0.000*
Range	1.5-6.5	3.8-6.8	
Perceived competence for learning:			
Mean ± SD	3.83 ± 0.90	6.43 ± 0.58	0.000*
Range	2.3-7.0	4.5-7.0	

Table (5): Distribution of the studied simulation group regarding to simulation effectiveness tool (Modified SET-M)

Items	Strongly agree		Somewhat agree		Disagree	
	No.	%	No.	%	No.	%
Pre-briefing:						
Pre-briefing increased my confidence	35	70.0	15	30.0	0	0.0
Pre-briefing was beneficial to my learning	39	78.0	11	22.0	0	0.0
Scenario:						
I am better prepared to respond to change in my patient's condition	39	78.0	11	22.0	0	0.0
I developed a better understanding of the pathophysiology	30	60.0	20	40.0	0	0.0
I am more confident of my nursing assessment skills	41	82.0	9	18.0	0	0.0
I felt empowered to make clinical decision	31	62.0	17	34.0	2	4.0
I developed a better understanding of medications (leave blank if no medications in scenario	21	42.0	29	58.0	0	0.0
I had the opportunity to practice my clinical decision making	27	54.0	23	46.0	0	0.0
I am more confident in my ability to pritorize care and intervention	42	84.0	8	16.0	0	0.0
I am more confident in communicating with my patients	41	82.0	9	18.0	0	0.0
I am more confident in my ability to teach patients about their illness and intervention	37	74.0	13	26.0	0	0.0
I am more confident to report information to health care team	33	66.0	17	34.0	0	0.0
I am more confident in providing intervention that faster patient safety	43	86.0	5	10.0	2	4.0
I am more confident in using evidence-based practice to provide nursing care	29	58.0	21	42.0	0	0.0

Conti. Table (5)

Debriefing:						
Debriefing contributed to my learning	36	72.0	12	24.0	2	4.0
Debriefing allowed me to verbalize feeling before focusing on the scenario.	36	72.0	10	20.0	4	8.0
Debriefing was valuable in helping me improve my clinical judgment	40	80.0	10	20.0	0	0.0
Debriefing provide opportunities to self-reflect on my performance during simulation	38	76.0	12	24.0	0	0.0
Debriefing was constructive evaluation of the simulation.	34	68.0	16	32.0	0	0.0
What else would you like to say about today's simulated clinical experience?	37	74.0	12	24.0	1	2.0

Table (6): Distribution of mean score of the studied sample regarding to management and nursing intervention for bronchial asthma after different teaching methods used

Items	Control group (n= 50)	Study group (n= 50)	P-value
	Mean ± SD	Mean ± SD	
Management	9.76 ± 3.09	28.44 ± 2.38	0.000*
Nursing intervention	16.46 ± 5.83	37.74 ± 4.30	0.000*

Table (7): Relation between personal characteristics and mean score of knowledge in pre and posttest among simulation group

Personal characteristics	Knowledge Score (Pre-test) Mean ± SD	Knowledge Score (Post-test) Mean ± SD
Age: (years)		
18 – 20	5.18 ± 1.34	32.64 ± 13.96
> 20	4.94 ± 1.92	35.24 ± 11.06
P-value	0.817	0.348
Sex:		
Male	5.52 ± 3.24	33.88 ± 12.58
Female	4.48 ± 2.28	32.98 ± 13.86
P-value	0.298	0.735
Academic achievement for previous year:		
Excellent	6.82 ± 3.89	32.50 ± 10.78
Very good	5.39 ± 2.34	34.89 ± 12.07
Good	3.93 ± 1.87	35.00 ± 16.16
Pass	2.75 ± 0.70	30.38 ± 15.47
P-value	**0.016***	**0.631**

Table (8): Relation between personal characteristics and mean score of management and nursing intervention in posttest among study group

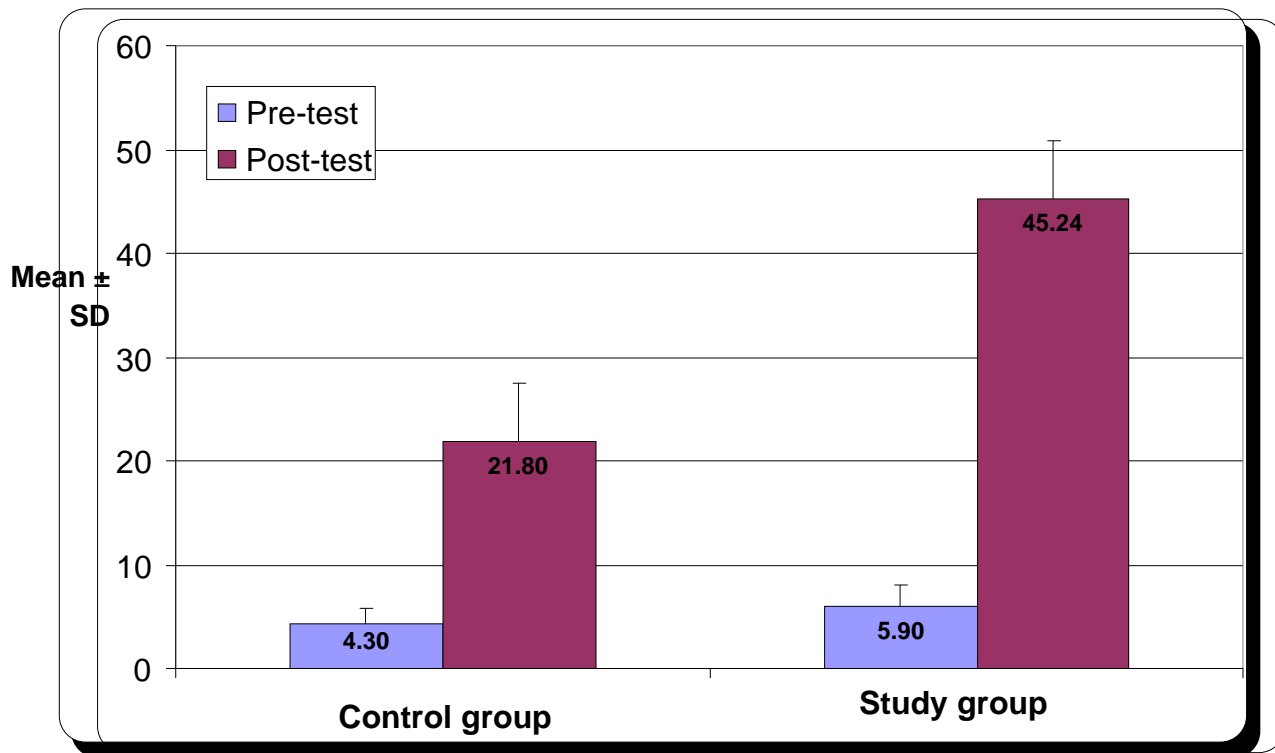| Personal characteristics	Management and nursing intervention Mean ± SD
Age: (years)	
18 – 20	18.47 ± 7.44
> 20	20.32 ± 5.97
P-value	0.381
Sex:	
Male	18.90 ± 6.96
Female	19.40 ± 7.08
P-value	0.807
P-value	0.794
Academic achievement for previous year:	
Excellent	21.18 ± 6.05
Very good	18.54 ± 6.29
Good	18.00 ± 8.05
Pass	16.38 ± 8.74
P-value	0.037*

Figure (1): Total means score of Knowledge about bronchial asthma among Control and Study
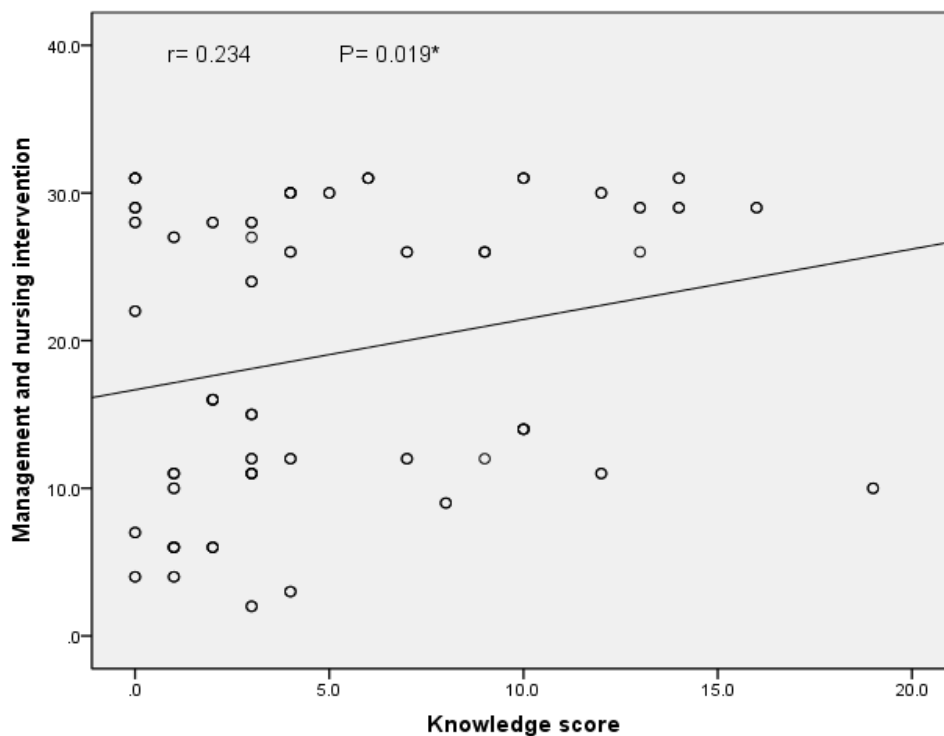

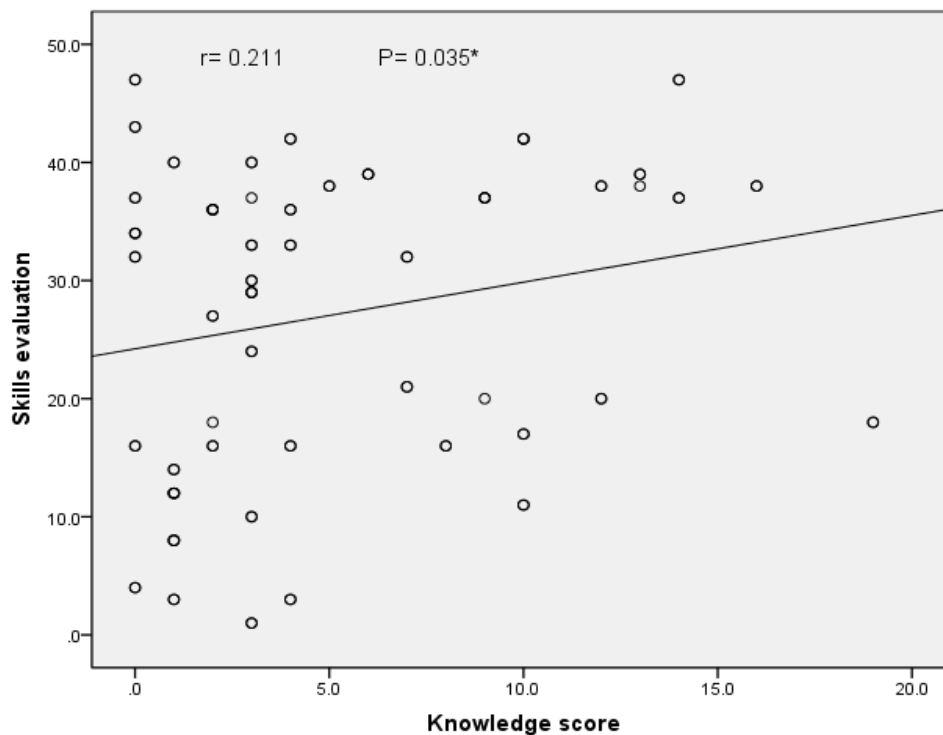**Figure (2) Correlation between knowledge score, management and nursing intervention among simulation group**

Figure (3): Correlation between knowledge score and practice among simulation

Discussion

Simulation now plays a significant role in the education and training of nursing students. In traditional learning situations, simulation is an effective tool. Many tools have been established to assist learning in higher education as a result of technological advancements. Simulations have been utilized to assist cognitive learning styles, improve discriminatory, collaborative, and skilled learning, and develop higher levels of thinking and problem-solving skills. **(Chernikova and colleagues, 2020).** Nursing students that received simulation training enhanced their knowledge acquisition and respond to learning demands. **(Olaussen and colleagues, 2022).** The aim of the study was to investigate the effect of simulation-based learning on improving cognitive

achievement of nursing students caring for patients with bronchial asthma.

The current study found that more than two-thirds of the control and study groups were between the ages of 18 and 20. In terms of previous year's academic accomplishment, more than a third of the control and study groups received high marks. In terms of gender, more than half of the students in both the study and control groups were girls, according to the findings. This is attributable to an increase in the number of females admitted to faculty and the number of males newly admitted to careers. This finding is consistent with **Ahmed et al., (2015),** who investigated the impact of simulation-based learning on nursing students' performance, self-efficacy, satisfaction, and confidence during pediatric injection administration.

The current investigation discovered a statistically significant difference in examined sample knowledge between the control and study groups in the post-test. Students' knowledge may improve as a result of the employment of various instructional approaches, including simulations in study groups. The findings of **Saied (2017)**, who investigated The Impact of Simulation on Pediatric Nursing Students' Knowledge, Self-efficacy, Satisfaction, and Confidence, were consistent with these findings.

Additionally in consistence with Kim and Kim (2015) who carried out study about Effects of Simulation on Nursing Students' Knowledge, Clinical Reasoning, and Self-confidence and reported that there was a significant difference in knowledge scores before and after the test. **Zarifcanaiey, et al., (2016)** conducted a study comparing educational strategies for the acquisition of nursing students' performance and critical thinking and concluded that the experimental group achieved significantly higher performance scores than the control group due to the positive effects of using methods integrated with critical practice, problem-solving skills, clinical efficacy, academic performance, and clinical coherence.

Toward studied sample practice regarding to nursing intervention for patient with bronchial asthma, the study illustrated that the majority of students' practice were improved posttest after implemented simulation based learning with increase in mean and SD. This can be interpreted as using simulation scenarios in teaching play an

effective role in transforming knowledge into behavior and bridging knowledge gaps because it improves brainstorming skills and touch on memorable, memory-enhancing cognitive, psychomotor, and emotional skills.

Moreover, from the point view of the researchers, simulation' value in improving students practice and simulation tend to be a bright educational intervention to increase students satisfaction with learning experience, and improve skill performance. Also the present study observed that there was statistical significant difference in all nursing intervention items among control and study group. This finding was supported by those **Permana et al., (2019)** who carried out study regarding the impact of virtual reality simulation on cognitive achievement of nursing students and mentioned that Statistically, VRS has a statistically significant effect on improving nursing students' cognitive performances caring for ARI patients compared to traditional methods.

Likewise, these results are harmonious with **Gamal El-deen et al., (2015**) who mentioned that the level of total performance is higher after simulation-based learning than traditional teaching method. Also these findings in the line with study conducted by **AbdElfattah et ah., (2019)** to evaluate the Effect of Simulation on Students' Achievement in Normal Labor Modules, who reported that mean score of studied sample practice regarding labor procedures post intervention, had a highly statistical significant difference regarding their practical skills during process of labor.

As regard to perceived competence for learning scale among control and study group. The results of this study demonstrated that there was a statistically significant difference between the control and study groups in all scale-related claims. This could be because students who were trained using simulation had higher perceived competency, demonstrating the benefit of simulation in boosting students' knowledge and practice. This finding consistent with **Ahmed et al., (2018)** who assess effect of simulation on critical thinking, satisfaction and self-confidence of nursing students during care of pneumonic child who declared that there was a significant improvement in the critical thinking score of simulation group compared to the control group and simulation group.

Also these results of the present study are in accordance with the study by **Qalawa et al., (2020)** who investigated Effectiveness of Applying Simulation Based Learning on Nurses' Performance and Self-Efficacy Regarding Advanced Basic Life Support found that there was were highly statistically significance difference pre and post implementation of simulation based learning in all items of ABLS Self-Efficacy with increased in mean.

The results of this study revealed that there was no statistically significant difference between age and gender, but there was a statistically significant difference between previous year's academic achievement and mean knowledge score in the simulation group's pre-test. These outcomes are comparable to those of **Abdou & Abass (2021),**

who examine effect of high fidelity simulation on nursing students' knowledge and skills regarding assessment and nursing intervention of acute coronary syndrome and reported that there was no statistically significant difference between the knowledge level of nursing students and previous training on age, marriage history, and ACS. In contrast to the findings of current study, **Haukedal et al; (2018)** who conducted a study to explore the impact of a new pedagogical intervention on nursing students' knowledge acquisition in simulation-based learning and found that Student knowledge scores increased with age in both groups

In the post-test of the study group, there was no statistically significant difference between age and sex with management and nursing intervention, according to the current study. According to **Tubaishat A, Tawalbeh L (2018),** who investigated the effect of simulation on advanced cardiac life support knowledge, knowledge retention, and confidence of Jordanian nursing students, there was no statistically significant difference in nursing student performance levels with respect to ACS after simulation-based learning and application of their various ages. In terms of the association between students' knowledge and practice prior to the adoption of simulation-based learning, the current study found a strong positive correlation between students' overall knowledge and practice. These outcomes are comparable to **Qalawa et al., (2020)** who found that highly positive correlation between nurse's ' work, total knowledge and practice.

Conclusion

This study concluded that:

Simulations have a significant impact on improving the cognitive ability of nursing students in caring for patients with bronchial asthma compared to face-to-face lectures. Simulations can be used as a learning method to vividly convey nursing concepts, theories, and practical skills. Similarly; this study concluded that students felt that simulation was an effective educational technique.

Recommendations:

Based on the findings of the current study, the following recommendations can be suggested:

Nursing education programs need to incorporate simulation into undergraduate education and support the introduction of simulation-based learning as an important step in curriculum development.

Further study needs to be performed:

- Consider further studies about exploring the effect of simulation based learning on the nursing students' clinical judgment and decision making

- This study should be replicated with more participants and at several universities to determine measurable outcomes of simulation and to generate larger statistical power with a diverse group of students.

- Conducting another research to assess the effect of simulation on the objective structured clinical exam (OSCE).

- Another study should be conducted to assess effect of simulation after long period of time.

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