Original Article

Simulation To Replace Clinical Hours In Nursing: An Interventional Study

Amoldeep[1], Simarjeet Kaur[2*], Dr. (Mrs.) Jyoti Sarin[3]

[1]Associate Professor, Maharishi Markandeshwar College of Nursing, Maharishi Markandeshwar (Deemed to be University), Mullana-133207. Haryana, India. Orchid Id: https://orcid.org/0000-0002-9529-3103
[2*]Associate Professor, Department of Obstetrics and Gynaecology Nursing, Maharishi Markandeshwar College of Nursing, Maharishi Markandeshwar Deemed to be University, Mullana- 133207. Haryana, India. Orchid Id: https://orcid.org/0000-0001-8883-1690, Email: coolsimar89@mmumullana.com
[3]Dean, Faculty of Nursing, Maharishi Markandeshwar Deemed to be University, Mullana - 133207. Haryana, India. Orchid Id: https://orcid.org/0000-0002-6445-287X

***Corresponding Author -** Simarjeet Kaur
[*]Associate Professor, Department of Obstetrics and Gynaecology Nursing, Maharishi Markandeshwar College of Nursing, Maharishi Markandeshwar Deemed to be University, Mullana- 133207. Haryana, India. Orchid Id: https://orcid.org/0000-0001-8883-1690, Email: coolsimar89@mmumullana.com
DOI: 10.47750/pnr.2023.14.02.428

Abstract

Technology will never replace great teachers, but in the hands of great teachers, Technology can be transformational. The study aimed to evaluate the effectiveness of simulation-based learning in terms of competency (Knowledge, skills & clinical decision making) of nursing students. Quantitative research approach with quasi experimental research design was done. Total enumerative sampling technique was used to select 405 B.Sc. (N) students from constituent colleges of nursing of MMDU Mullana. At the baseline, lecture cum discussion followed by skill sets was given by respective subject incharge on the selected medical conditions. On day 1, pre assessment of knowledge, skill through OSCE and clinical decision-making ability was conducted. Next day, students were randomly allocated to simulation group and clinical practice group by computerized random table. For the two consecutive days, intervention was administered with the help of parallel case scenarios on standardized patient/ simulators and post- test was conducted on day 15. Data was analyzed by using nonparametric test and parametric test by using SPSS 20 version. The study result showed that both simulation as well as clinical practice is effective to enhance knowledge, skills, and clinical decision-making ability of nursing students with replacement of clinical hours with simulated hours for medical surgical nursing I (15%), child health nursing (20%), mental health nursing (10%) and midwifery & obstetrical nursing (30%).

Keywords: Simulation, clinical hours, nursing students.

INTRODUCTION

Nursing curriculum necessitates the understanding of human behavior among its practitioners to provide care with respect and dignity and protect the rights of individuals and groups.[1] Indian Nursing council's revised curriculum embraces competency based and outcome-based approach throughout the program and integrates self-directed learning. Competency based approach can be achieved through learning in skill/ simulated lab and in clinical environment. There are numerous teaching modalities that are effective in enhancing knowledge and skills.[2] Now days, simulation has been gaining significant popularity in achieving clinical practice goals. Simulation relates to the degree of realism through the use of high-fidelity simulators and standardized patients by using electronic, mechanical or soft based activities.[3]

Simulation integrates knowledge and skills to enrolled students in health care. It is an active pedagogical strategy which benefits students to consolidate skills and develop a habit for reflection.[4] Simulation based education is one of the progressive educational training methods that can be used to amplify factual world experience with guided experiences in an interactive manner. Simulation provides opportunity for repetition to facilitate novice to experts: make conceptual connections to promote clinical thinking and decision making. From an ethical perspective, simulation allows students to make mistake in safe and controlled environment Integration of simulation in clinical encourage clinical behavior of students in actual care situations. In addition, study outcomes demonstrated the positive impact of learning by simulation on knowledge, critical thinking, motivation, approachability, self-confidence, leadership, team collaboration and communication skills.[5]

Figure 1. The Circle of Learning

The circle of learning focus on five learning styles which can be applied step by step to achieve a competency in a given scenario or task. The goal is to build, share and express knowledge through a process of team approach in a safe environment.[6]

NEED OF REPLACEMENT OF CLINICAL HOURS IN NURSING

An increasing focus on quality, higher acuity, safety, specialized & complex clinical practice emphasize the need of incorporating innovative experiential learning. With high fidelity simulation, educator can replicate many patient situations and students can develop their nursing skills. The number of clinical hours is set by the regulatory body to facilitate well rounded knowledge skills and attitude to enter the profession. There is a need to redesign the clinical teaching model to overcome the health care challenges such as large student placement cost, lack of willingness and student access to electronic patient record, disparities in teaching experiences and practices.[7]

Substituting a proportion of clinical placement hours with simulation has been touted as a decent alternative as this practice strengthens the skills, knowledge and decision making. Nursing simulation for graduates brings real life scenario in the tutorial room, allowing students to boost their clinical reasoning skills when they authoritatively enter into the nursing profession. The replacement of clinical hours with simulated hours is already being practiced in several countries with some success and limited generalizability. As, clinical simulation can bridge the gap between knowledge gained and clinical practice with patients especially in limited clinical opportunities[8]. Simulation based learning can be inculcated in numerous ways such as role playing, computer assisted instructions, standardized patients, task training and use of low to high fidelity manikins.[9] Despite the complexity of simulation method, it will be integrated throughout the curriculum for the rarest medical conditions to enable them to develop competencies before entry into real field of practice. Although, there is no definitive criteria for replacement of clinical hours with simulation hours. (10%, 15%, 20%, 30 % and so on).

Initiative: To integrate simulation-based learning in curriculum of undergraduate nursing students.
Goal: To evaluate the effectiveness of simulation-based learning in terms of competency (Knowledge, skills & clinical decision making) of nursing students.

Strategic Approach

Quantitative research approach with quasi experimental research design was used to evaluate the effectiveness of simulation-based learning versus clinical practice as per master rotation plan. Total enumerative sampling technique was used to enrolled 405 B.Sc. (N) students from constituent colleges of nursing of MMDU Mullana. In this study, simulation- based learning refers to the technique which improves the competency through as close as real-life situational experiences with the help of two parallel simulation scenarios. In medical surgical, child health, mental health and midwifery and obstetrical conditions (Table 1) as evidenced from knowledge, skills and clinical decision-making ability scores of B.Sc. (N) 2nd, 3rd& 4th year students.

From the previous clinical experience, it was found that all students were unable to get adequate exposure in independently handling of few situation in clinical areas such as Management of myocardial infarction; Management of post COVID complications; Care of patient on defibrillator; Management of MIS-C; Preterm newborn care; Management of post-traumatic stress disorder; Conduction of normal vaginal delivery; Management of postpartum hemorrhage; Management of antepartum hemorrhage and Management of hypertensive disorders of pregnancy. At the baseline, lecture cum discussion followed by skill sets was given by respective subject incharge on the above selected medical conditions. On day 1, pre assessment of knowledge, skill through OSCE and clinical decision-making ability was conducted. Next day, students were randomly allocated to simulation group and clinical practice group by computerized random table. To sensitize the nursing students, video on simulation-based learning regarding defibrillator, myocardial infarction, COVID complications, MISC, neonatal equipment's, conduction of normal vaginal delivery and post-traumatic stress disorders was administered. For the two consecutive days, intervention was administered with the help of parallel case scenarios on standardized patient/ simulators. Duration of each session of

simulation was 90 minutes which includes pre briefing, act and debriefing. After 15 days of intervention, post- test was conducted.

Table 1: Schematic Representation of research design

GROUP	Day 1	Day 2-3	Day 15
Simulation Group	Pre assessment • Knowledge, • skills • clinical decision-making ability	• Random Allocation of students • Administration of Simulation based learning video on selected medical condition. • Administration of simulation-based learning on two parallel case scenarios with standardized human simulator/ high fidelity manikin	Post-assessment • Knowledge, • skills • clinical decision-making ability
Clinical Practice Group	Pre assessment • Knowledge, • skills • clinical decision-making ability	Clinical experience as per master rotation plan	Post-Pre assessment • Knowledge, • skills • clinical decision-making ability

Table 2: Description of replacement of clinical hours with simulated hours

Year	Subject	Topic	Area of Skills	Area of Two Parallel Case Scenarios	Simulator used	INC Allotted hours	Simulated hours	Percentage
B Sc. 2nd year	Medical Surgical nursing I	Management of Myocardial infarction	• Initial assessment of the patient of MI • Diagnostic and investigations of the patient with MI • Management and self-care of the patient with MI	• Severe chest pain with hypertension and post PTCA • Severe chest pain with hypertension and Type II Diabetes	Standardized patient	720	32 hours	15%
		Management of Post COVID complications	• Management of post COVID mucormycosis • Management of post COVID pneumonia • Management of post COVID chronic fatigue syndrome • Management of post COVID diabetes • Management of post COVID myocardial infarction	• Management of Post COVID of MI • Management of Post COVID of pneumonia and chronic fatigue	Standardized patient		32 hours	
		Care of patient on defibrillator	• Concept of ECG and defibrillation • Indications and contraindication • Initial steps • Perform defibrillation • Post procedural steps	• Management of Ventricular fibrillation with defibrillator • Management of ventricular tachycardia with defibrillator	High fidelity manikin		32 hours	
B Sc. 3rd year	Child health nursing	Management of MIS-C	• Assessment • First tier investigations and first line management • Second tier and management for mild cases • Management of moderate to severe cases • Discharge and follow up	• Management for a child for MIS-C • Management for a child for severe MIS-C	Standardized patient	270	32 hours	20%
		Pre term newborn care	• Axillary temperature • Thermal care • Radiant warmer • KMC • EBM • Orogastric feeding • Paladai feeding	• Management of preterm newborn with hypothermia and KMC • Management of preterm newborn with EBM, Orogastric and paladai feeding	High fidelity manakin		32 hours	
	Mental health nursing	Management of Post-traumatic stress disorders	• Initial assessment • Diagnostic criteria • Management by reassurance therapy • Prolonged exposure therapy	• Psychiatric assessment and management with relaxation techniques and copying strategies • Psychiatric assessment and management with CBT	Standardized patient	270	32 hours	10%
B Sc. 4th year	Midwifery & obstetrical nursing	Conduction of normal vaginal delivery	• Preparation of linen tray and PPE tray • Preparation of delivery and episiotomy tray • Preparation of mother for delivery • Conduction of normal vaginal delivery • Perform immediate newborn care	• Conduction of delivery with episiotomy • Conduction of delivery with episiotomy	High Fidelity simulator	420	32 hours	30%
		Management of post-partum hemorrhage	• Initial assessment of PPH • Identify the amount of bleeding and steps of blood transfusion • Management of PPH • Steps of bimanual compression	• Primary PPH • Secondary PPH	Standardized patient		32 hours	
		Management of Ante-partum hemorrhage	• Maintenance of input output chart • Degree of placenta previa • Blood transfusion • Maintenance of fetal well being • Management of Placenta previa • Management of Abruptio placenta	• Management of Placenta previa • Management of Abruptio placenta	Standardized patient		32 hours	
		Management of hypertensive disorders of pregnancy (HDP)	• Concept of HDP • Pre-eclampsia assessment and management • Eclampsia • IV/IM Loading dose of $MgSo_4$ • Maintenance dose of $MgSo_4$ • IV dose of $MgSo_4$for recurrent convulsions • Fetal well-being chart	• Management of Pre- eclampsia • Management of Eclampsia	Standardized patient		32 hours	

Table 2 presents the replacement of clinical hours with simulated hours. Simulation based learning was administered for four days (4 X 8 hours) for each case. Total percentage of replaced clinical hours with simulation for medical surgical nursing I (15%), child health nursing (20%), mental health nursing (10%) and midwifery & obstetrical nursing (30%).

Table 3: Mean percentage of Knowledge, Skills, Clinical Decision-Making Ability of nursing students

Year	Subject	Topic	Group	Knowledge		Skills		Clinical Decision-Making Ability	
				Mean percentage		Mean percentage		Mean percentage	
				Pre test	Post test	Pre test	Post test	Pre test	Post test
B.Sc (N) 2nd year	Medical Surgical nursing I	Management of Myocardial infarction	Simulation	41.63	55.37	39.68	64.32	34.38	49.38
			Clinical Practice	44.43	50.53	38.38	43.21	35.25	50.63
		Management of Post COVID complications	Simulation	34.63	45.57	44.59	58.10	43.92	49.04
			Clinical Practice	44.43	40.33	45.63	48.39	40.72	29.52
		Care of patient on defibrillator	Simulation	57.33	58.93	37.18	62.42	50.90	66.55
			Clinical Practice	56.97	50.83	31.89	55.13	51.45	53.25
B.Sc (N) 3rd year	Child health nursing	Management of MIS - C	Simulation	39.30	54.13	28.69	55.00	41.73	46.20
			Clinical Practice	39.10	45.20	30.79	47.43	43.13	46.13
		Preterm Newborn care	Simulation	45.22	58.27	31.23	60.53	40.73	59.47
			Clinical Practice	46.89	49.91	35.71	60.68	40.73	47.97
	Mental health nursing	Management of Post-traumatic stress disorders	Simulation	39.67	55.67	43.50	64.50	34.20	49.20
			Clinical Practice	40.33	43.43	43.75	58.50	36.00	48.00
B.Sc (N) 4th year	Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	Simulation	47.00	56.86	45.00	63.54	44.08	62.52
			Clinical Practice	41.49	47.46	39.54	64.62	41.92	45.80
		Management of post-partum hemorrhage	Simulation	45.37	67.86	37.18	61.82	27.95	63.95
			Clinical Practice	46.26	63.71	35.75	56.14	27.00	48.30
		Management of Ante-partum hemorrhage	Simulation	29.70	42.77	37.50	73.71	25.24	40.52
			Clinical Practice	30.23	43.93	33.08	50.40	29.40	42.00
		Management of hypertensive disorders of pregnancy	Simulation	36.03	50.83	35.68	58.89	30.83	40.00
			Clinical Practice	36.71	51.00	33.71	57.29	30.53	31.37

Table 3 depicts that mean percentage of knowledge, skills, clinical decision-making ability of nursing students in simulation and clinical practice group.

In B.Sc. (N) 2nd year, post mean percentage was higher than the pre mean percentage in terms of knowledge, skill and clinical decision making ability regarding management of myocardial infarction; management of post COVID complications and care of patient on defibrillator in simulation and clinical practice group expect pre knowledge mean percentage of management of post COVID complications and care of patient on defibrillator; pre-clinical decision making ability mean percentage was also higher than post mean percentage in management of post COVID complications in clinical practice group.

In B.Sc. (N) 3rd year, post mean percentage was higher than the pre mean percentage in terms of knowledge, skill and clinical decision-making ability regarding management of MIS-C, preterm newborn care and management of post-traumatic stress disorder in simulation and clinical practice group.

In B.Sc. (N) 4th year, post mean percentage was higher than the pre mean percentage in terms of knowledge, skill, and clinical decision-making ability regarding conduction of normal vaginal delivery, management of postpartum hemorrhage, management of antepartum hemorrhage and management of hypertensive disorders of pregnancy in simulation and clinical practice group.

Thus, it inferred that both simulation as well as clinical practice is effective to enhance knowledge, skills and clinical decision-making ability of nursing students.

Table 4: Comparison of Knowledge within Simulation and Clinical Practice Group

Year / Course	Topic	Group	Max. score	Knowledge		t Value/ Z value	p Value
				Pretest	Post Test		
B.Sc. (N) 2nd year Medical surgical Nursing	Management of Myocardial infarction	Simulation	30	12.49 ± 3.90	16.61±3.50	5.91^t	0.00*
		Clinical Practice	30	13.33 ±4.00	15.16 ± 4.1	3.04^t	0.00*
	Management of Post COVID complications	Simulation	30	10.39 ± 4.67	13.67±4.16	4.81^t	0.00*
		Clinical Practice	30	13.33 ± 4.95	12.01±3.53	2.29^t	0.02*
	Care of patient on defibrillator	Simulation	30	17.20 ±4.57	17.68±4.37	1.56^Z	0.11^{NS}
		Clinical Practice	30	17.90 ±4.97	15.25±4.95	2.51^Z	0.01*
B.Sc. (N) 3rdyear Child health Nursing	Management of MIS – C	Simulation	30	11.79 ±3.30	16.24 ±4.91	5.23^Z	0.00*
		Clinical Practice	30	11.73 ±3.90	13.56 ±4.69	3.37^Z	0.00*
	Preterm Newborn care	Simulation	45	20.35 ± 6.60	26.22± 5.24	9.54^t	0.00*
		Clinical Practice	45	21.10 ± 6.76	22.46± 6.54	1.40^t	0.16^{NS}
B.Sc. (N) 3rdyear Mental health Nursing	Management of Post-traumatic stress disorders	Simulation	30	11.90 ± 3.25	16.70± 2.84	6.80^Z	0.00*
		Clinical Practice	30	12.10 ± 3.50	13.03± 3.44	1.46^Z	0.14^{NS}
B.Sc. (N) 4th Year Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	Simulation	35	16.45 ± 4.94	19.90± 5.07	6.45^t	0.00*
		Clinical Practice	35	14.52 ± 3.87	16.79± 4.92	3.71^t	0.00*
	Management of post-partum hemorrhage	Simulation	35	15.88 ± 4.44	23.75± 4.10	10.33^t	0.00*
		Clinical Practice	35	16.19 ± 4.35	22.30± 4.18	7.66^t	0.00*
	Management of Ante-partum hemorrhage	Simulation	30	8.91 ± 5.86	12.83± 4.98	4.00^Z	0.00*
		Clinical Practice	30	9.07 ± 6.03	13.18± 5.53	3.89^Z	0.00*
	Management of hypertensive disorders of pregnancy	Simulation	35	12.61 ± 4.54	17.79± 6.08	5.41^t	0.00*
		Clinical Practice	35	12.85 ± 5.84	17.08± 6.20	4.12t	0.00*

Table 4 depicts the comparison of knowledge within simulation and clinical practice group by using paired t-test and Wilcoxon Signed Rank test (Z) because of normality test.

In B.Sc. (N) 2nd year, the mean post knowledge score was higher than the mean pre knowledge score in both the groups except in management of post COVID complications and care of patient on defibrillator in clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups except in care of patient on defibrillator in simulation group.

In B.Sc. (N) 3rd year, the mean post knowledge score was higher than the mean pre knowledge score in simulation and clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups except in case of preterm newborn care and management of post-traumatic stress disorders in clinical practice group.

In B.Sc. (N) 4th year, the mean post knowledge score was higher than the mean pre knowledge score in simulation and clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups.

Thus, it inferred that simulation and clinical practice were effective to enhance the knowledge of nursing students.

Table 5: Comparison of Skills within Simulation and Clinical Practice Group

Year/ Course	Topic	Group	Max. Score	Skills		t Value/ Z value	p Value
				Pre test	Post Test		
B.Sc. (N) 2ndyear Medical surgical Nursing	Management of Myocardial infarction	Simulation	34	13.49±2.80	21.87±3.50	13.84^t	0.00*
		Clinical Practice	34	13.05±2.12	14.69±3.70	2.65^t	0.01*
	Management of Post COVID complications	Simulation	41	18.28±3.17	23.82±3.72	5.92^Z	0.00*
		Clinical Practice	41	18.71±2.59	19.84±3.69	3.17^Z	0.00*
	Care of patient on defibrillator	Simulation	45	16.73±6.54	28.09±4.57	15.68^t	0.00*
		Clinical Practice	45	14.35±6.08	24.81±5.26	14.71^t	0.00*
B.Sc. (N) 3rdyear Child health Nursing	Management of MIS - C	Simulation	42	12.05±4.09	23.10±4.08	18.53^t	0.00*
		Clinical Practice	42	12.97±4.88	19.92±5.26	8.44^t	0.00*
	Preterm Newborn care	Simulation	75	23.42±8.80	45.40±7.45	26.12^t	0.00*
		Clinical Practice	75	26.78±6.85	45.51±8.36	19.50^t	0.00*
B.Sc. (N) 3rdyear Mental health Nursing	Management of Post-traumatic stress disorders	Simulation	40	17.40±4.03	25.8 ±2.29	10.00^t	0.00*
		Clinical Practice	40	17.50±4.63	23.40±2.54	10.00^t	0.00*
B.Sc. (N) 4th Year Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	Simulation	65	29.25±6.30	47.08±5.23	19.91^t	0.00*
		Clinical Practice	65	25.79±5.74	42.00±5.70	3.71^t	0.00*
	Management of post-partum hemorrhage	Simulation	44	16.36±3.05	27.27±4.38	15.41^t	0.00*
		Clinical Practice	44	15.43±4.02	24.77±5.39	12.31^t	0.00*
	Management of Ante-partum hemorrhage	Simulation	52	19.50±5.28	38.33±6.03	6.73^Z	0.00*
		Clinical Practice	52	17.70±7.01	26.21±8.06	5.97^Z	0.00*
	Management of hypertensive disorders of pregnancy	Simulation	93	33.18±7.45	54.77±7.09	6.39^Z	0.00*
		Clinical Practice	93	31.75±7.00	53.28±7.44	6.68^Z	0.00*

Table 5 depicts the comparison of skills within simulation and clinical practice group by using paired t-test and Wilcoxon Signed Rank test (Z) on the basis of normality test.

In B.Sc. (N) 2nd year, the mean post skills score was higher than the mean pre skills score in both the groups. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups.
In B.Sc. (N) 3rd year, the mean post skills score was higher than the mean pre skills score in simulation and clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups.
In B.Sc. (N) 4th year, the mean post skills score was higher than the mean pre skills score in simulation and clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups.
Thus, it inferred that simulation and clinical practice were effective to enhance the skills of nursing students.

Table 6: Comparison of Clinical Decision-Making Ability within Simulation and Clinical Practice Group

Year / Course	Topic	Group	Max. Score	Clinical Decision-Making Ability		t Value/ Z value	p Value
				Pre test	Post Test		
B.Sc. (N) 2nd year Medical surgical Nursing	Management of Myocardial infarction	Simulation	16	5.50 ±1.60	7.94±1.70	5.59^{Z}	0.00*
		Clinical Practice	16	5.64 ±1.80	8.19 ±1.70	5.68^{Z}	0.00*
	Management of Post COVID complications	Simulation	25	10.98±6.70	12.26±6.36	4.69^{t}	0.00*
		Clinical Practice	25	10.18±5.35	10.38± 4.51	0.67^{t}	0.50^{NS}
	Care of patient on defibrillator	Simulation	20	10.18±3.34	13.13± 3.74	5.76^{t}	0.00*
		Clinical Practice	20	10.30±3.06	10.65± 4.36	0.66^{t}	0.51^{NS}
B.Sc. (N) 3rd year Child health Nursing	Management of MIS – C	Simulation	15	6.26 ± 2.12	6.93 ± 2.08	2.29^{Z}	0.01*
		Clinical Practice	15	6.47 ± 2.22	6.92 ± 2.26	1.42^{Z}	0.15^{NS}
	Preterm Newborn care	Simulation	30	12.22±4.89	17.84± 2.84	9.91^{t}	0.00*
		Clinical Practice	30	12.22±5.08	14.39± 5.47	2.92^{t}	0.00*
B.Sc. (N) 3rd year Mental health Nursing	Management of Post-traumatic stress disorders	Simulation	25	8.55 ± 2.93	12.30± 2.76	6.84^{t}	0.00*
		Clinical Practice	25	9.00 ± 2.09	12.00± 2.79	6.60^{t}	0.00*
B.Sc. (N) 4th year Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	Simulation	25	11.02±2.90	15.63± 4.10	5.79^{Z}	0.00*
		Clinical Practice	25	10.48±2.77	11.45± 1.00	1.88^{Z}	0.06^{NS}
	Management of post-partum hemorrhage	Simulation	20	5.59 ± 1.80	12.79± 2.10	5.82^{Z}	0.00*
		Clinical Practice	20	5.40 ± 2.66	9.66 ± 2.52	6.52^{Z}	0.00*
	Management of Ante-partum hemorrhage	Simulation	25	6.31 ± 4.83	10.13± 5.79	4.20^{Z}	0.00*
		Clinical Practice	25	7.35 ± 5.11	10.50± 5.38	4.19^{Z}	0.00*
	Management of hypertensive disorders of pregnancy	Simulation	30	9.25 ± 4.46	12.03± 2.86	4.60^{Z}	0.00*
		Clinical Practice	30	9.16 ± 3.80	9.46 ± 3.33	0.43^{Z}	0.66^{NS}

Table 6 depicts the comparison of clinical decision-making ability within simulation and clinical practice group by using paired t-test and Wilcoxon Signed Rank test (Z) on the basis of normality test.
In B.Sc. (N) 2nd year, the mean post clinical decision-making ability score was higher than the mean pre-clinical decision-making ability score in both the groups. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups except in management of post COVID complications and care of patient on defibrillator in clinical practice group.
In B.Sc. (N) 3rd year, the mean post clinical decision-making ability score was higher than the mean pre-clinical decision-making ability score in simulation and clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups except in management of MIS-C in clinical practice group.
In B.Sc. (N) 4th year, the mean post clinical decision-making ability score was higher than the mean pre-clinical decision-making ability score in simulation and clinical practice group. The computed t value / Z value was found to be statistically significant within simulation and clinical practice groups except in conduction of normal vaginal delivery and hypertensive disorders of pregnancy in clinical practice group.
Thus, it concluded that simulation and clinical practice were effective to enhance the clinical decision-making ability of nursing students.

Table 7: Comparison of Knowledge between Simulation and Clinical Practice Group

Year / Course	Topic	Test	Simulation Group	Clinical Practice Group	t Value/ Z value	p Value
B.Sc. (N) 2nd year Medical surgical Nursing	Management of Myocardial infarction	Pre test	12.49 ± 3.90	13.33± 4.00	0.86^{t}	0.38^{NS}
		Post Test	16.61 ± 3.50	15.16 ±4.10	1.98^{t}	0.04*
	Management of Post COVID complications	Pre test	10.39 ± 4.67	13.33± 4.95	3.27^{t}	0.00*
		Post Test	13.67 ± 4.16	12.10± 3.53	2.19^{t}	0.03*
	Care of patient on defibrillator	Pre test	17.20 ± 4.57	17.09 ±4.97	0.02^{Z}	0.98^{NS}
		Post Test	17.68 ± 4.37	15.25 ± 4.95	2.72^{Z}	0.00*
B.Sc. (N) 3rd year Child health Nursing	Management of MIS – C	Pre test	11.79 ± 3.30	11.73 ±3.90	0.30^{Z}	0.75^{NS}
		Post Test	16.24 ± 4.91	13.56± 4.69	2.87^{Z}	0.00*
	Preterm Newborn care	Pre test	20.35 ± 6.60	21.10± 6.76	0.60^{t}	0.54^{NS}
		Post Test	26.22 ± 5.24	22.46± 6.54	3.36^{t}	0.00*
B.Sc. (N) 3rd year Mental health Nursing	Management of Post-traumatic stress disorders	Pre test	11.91 ±3.25	12.10± 3.50	0.14^{Z}	0.88^{NS}
		Post Test	16.70 ± 2.84	13.03± 3.44	5.63^{Z}	0.00*
B.Sc. (N) 4th year Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	Pre test	16.45 ± 4.94	14.52± 3.87	2.33^{t}	0.02*
		Post Test	19.90 ± 5.07	16.79± 4.92	3.32^{t}	0.01*
	Management of post-partum hemorrhage	Pre test	15.88 ± 4.44	16.91± 4.30	0.37^{t}	0.71^{NS}
		Post Test	23.75 ± 4.10	22.30± 4.20	1.82^{t}	0.07^{NS}
	Management of Ante-partum hemorrhage	Pre test	8.91 ± 5.86	9.07 ± 6.03	0.26^{Z}	0.79^{NS}
		Post Test	12.83 ± 4.98	13.18± 5.53	0.31^{Z}	0.75^{NS}

	Management of hypertensive disorders of pregnancy	**Pre test**	12.61 ± 4.54	12.85± 5.84	0.24^{t}	0.81^{NS}
		Post Test	17.79 ± 6.08	17.08± 6.20	0.61^{t}	0.53^{NS}

Table 7 depicts the comparison of knowledge between simulation and clinical practice group by using unpaired t-test and Mann Whitney test (U) on the basis of normality test.

In B.Sc. (N) 2nd year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline except in management of post COVID complications. The computed t value / U value was found to be statistically significant between simulation and clinical practice groups at 0.05 level of significance after the intervention.

In B.Sc. (N) 3rd year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline. The computed t value / U value was found to be statistically significant between simulation and clinical practice groups at 0.05 level of significance after the intervention.

In B.Sc. (N) 4th year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline except in conduction of normal vaginal delivery. The computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance after the intervention except in conduction of normal vaginal delivery. However, the mean post knowledge score was higher than the pre mean knowledge score in both the groups.

Hence, it inferred that simulation and clinical practice were effective to enhance the knowledge of nursing students.

Table 8: Comparison of Skill between Simulation and Clinical Practice Group

Year/ Course	Topic	Test	Simulation Group	Clinical Practice Group	t Value/ Z value	p Value
B.Sc. (N) 2nd year Medical surgical Nursing	Management of Myocardial infarction	**Pre test**	13.49 ± 2.85	13.05 ± 2.12	1.10^{t}	0.27^{NS}
		Post Test	21.87±3.50	14.69 ± 3.70	10.30^{t}	0.00*
	Management of Post COVID complications	**Pre test**	18.28 ± 3.17	18.71 ± 2.59	0.40^{Z}	0.68^{NS}
		Post Test	23.82 ± 3.72	19.84 ± 3.69	6.29^{Z}	0.79^{NS}
	Care of patient on defibrillator	**Pre test**	16.73 ± 6.54	14.35 ± 6.08	2.00^{t}	0.04*
		Post Test	28.09 ± 4.57	24.81 ±5.26	3.53^{t}	0.00*
B.Sc. (N) 3rd year Child health Nursing	Management of MIS - C	**Pre test**	12.05± 4.09	12.97± 4.88	1.09^{t}	0.27^{NS}
		Post Test	23.10 ± 4.08	19.92± 5.26	3.65^{t}	0.00*
	Preterm Newborn care	**Pre test**	23.42 ± 8.80	26.78 ± 6.85	2.28^{t}	0.02*
		Post Test	40.40 ± 7.45	45.51 ± 8.36	0.07^{t}	0.94^{NS}
B.Sc. (N) 3rd year Mental health Nursing	Management of Post-traumatic stress disorders	**Pre test**	17.40 ± 4.03	17.50 ± 4.63	0.80^{t}	0.89^{NS}
		Post Test	25.80 ± 2.29	23.40 ± 2.54	5.28^{t}	0.00*
B.Sc. (N) 4th year Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	**Pre test**	29.23 ± 6.30	25.79 ± 5.74	3.08^{t}	0.00*
		Post Test	41.30 ± 6.00	42.00 ± 5.70	0.56^{t}	0.57^{NS}
	Management of post-partum hemorrhage	**Pre test**	16.36 ± 3.05	15.43 ± 4.02	1.35^{t}	0.17^{NS}
		Post Test	27.20 ± 4.38	24.77 ± 5.39	2.65^{t}	0.00*
	Management of Ante-partum hemorrhage	**Pre test**	19.50 ± 5.28	17.70 ± 6.78	1.17^{Z}	0.24^{NS}
		Post Test	38.33 ± 6.03	26.21 ± 8.06	7.51^{Z}	0.00*
	Management of hypertensive disorders of pregnancy	**Pre test**	33.18 ± 7.45	31.75 ± 7.00	0.98^{Z}	0.32^{NS}
		Post Test	54.77 ± 7.09	53.28 ± 7.44	0.97^{Z}	0.33^{NS}

Table 8 depicts the comparison of skills between simulation and clinical practice group by using unpaired t-test and Mann Whitney test (U) on the basis of normality test.

In B.Sc. (N) 2nd year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline except in care of patient on defibrillator. The computed t value / U value was found to be statistically significant between simulation and clinical practice groups at 0.05 level of significance after the intervention except in management of myocardial infarction.

In B.Sc. (N) 3rd year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline except in preterm newborn care. The computed t value / U value was found to be statistically significant between simulation and clinical practice groups at 0.05 level of significance after the intervention except in preterm newborn care.

In B.Sc. (N) 4th year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline except in conduction of normal vaginal delivery. The computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance after the intervention except in conduction of normal vaginal delivery and management of hypertensive disorders of pregnancy.

However, the mean post skill score was higher than the pre mean skill score in both the groups. Thus, it inferred that simulation and clinical practice were effective to enhance the skills of nursing students.

Table 9: Comparison of Clinical Decision-Making Ability between Simulation and Clinical Practice Group

Year / Course	Topic	Test	Simulation Group	Clinical Practice Group	t Value/ Z value	p Value
B.Sc. (N) 2nd year Medical surgical Nursing	Management of Myocardial infarction	**Pre test**	5.50 ±1.60	5.64 ± 1.80	0.11^{Z}	0.00*
		Post Test	7.90 ± 1.74	8.10 ± 1.78	0.60^{Z}	0.00*
	Management of Post COVID complications	**Pre test**	10.98 ± 6.70	10.18± 5.35	0.70^{t}	0.48^{NS}
		Post Test	12.26 ± 6.36	10.38± 4.51	1.83^{t}	0.07^{NS}
	Care of patient on defibrillator	**Pre test**	10.18 ± 3.34	10.30± 3.06	0.19^{t}	0.84^{NS}
		Post Test	13.13 ±3.74	10.65± 4.36	3.23^{t}	0.00*
B.Sc. (N) 3rd year Child health Nursing	Management of MIS - C	**Pre test**	6.26 ± 2.12	6.47 ± 2.22	0.59^{Z}	0.55^{NS}
		Post Test	6.93 ± 2.08	6.92 ±2.26	0.00^{Z}	0.00*
	Preterm Newborn care	**Pre test**	12.22 ± 4.89	12.22± 5.08	0.00^{t}	0.99^{NS}
		Post Test	17.84 ± 2.84	14.39± 5.47	4.17^{t}	0.00*
B.Sc. (N) 3rd year Mental health Nursing	Management of Post-traumatic stress disorders	**Pre test**	8.55 ± 2.93	9.00 ± 2.09	0.94^{t}	0.34^{NS}
		Post Test	12.30 ± 2.76	9.00 ± 2.09	7.26^{t}	0.00*
B.Sc. (N) 4th Year Midwifery & Obstetrical Nursing	Conduction of normal vaginal delivery	**Pre test**	11.02 ± 2.90	10.48± 2.77	0.96^{Z}	0.33^{NS}
		Post Test	15.63 ± 4.10	11.45± 1.00	5.40^{Z}	0.00*
	Management of post-partum hemorrhage	**Pre test**	5.59 ± 1.80	5.40 ± 2.66	0.07^{Z}	0.94^{NS}
		Post Test	12.79 ± 2.10	9.66 ±2.52	6.12^{Z}	0.00*
	Management of Ante-partum hemorrhage	**Pre test**	6.31 ± 4.83	7.35 ± 5.11	1.23^{Z}	0.21^{NS}
		Post Test	10.13 ± 5.79	10.50± 5.38	0.41^{Z}	0.67^{NS}
	Management of hypertensive disorders of pregnancy	**Pre test**	9.25 ± 4.46	9.16 ± 3.80	0.17^{Z}	0.86^{NS}
		Post Test	12.03 ± 2.86	9.41 ± 3.33	3.86^{Z}	0.00*

Table 9 depicts the comparison of clinical decision-making ability between simulation and clinical practice group by using unpaired t-test and Mann Whitney test (U) on the basis of normality test.

In B.Sc. (N) 2nd year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline except in management of myocardial infarction. The computed t value / U value was found to be statistically significant between simulation and clinical practice groups at 0.05 level of significance after the intervention except in management of post COVID complication.

In B.Sc. (N) 3rd year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline. The computed t value / U value was found to be statistically significant between simulation and clinical practice groups at 0.05 level of significance after the intervention.

In B.Sc. (N) 4th year, the computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance at the baseline. The computed t value / U value was found to be statistically non-significant between simulation and clinical practice groups at 0.05 level of significance after the intervention except in management of antepartum haemorrhage.

However, the mean post clinical decision-making ability score was higher than the pre mean clinical decision-making ability score in both the groups. Thus, it inferred that simulation and clinical practice were effective to enhance the clinical decision-making ability of nursing students.

DISCUSSION

Although there are various publications and research studies presenting the apparent value of simulation. There is a shortage of evidence showing percentage of replacement of simulated hours with clinical practice. So, researchers desired to evaluate the effectiveness of simulation-based learning in terms of competency of nursing students.

The current student revealed simulation-based learning was effective in enhancing competency of nursing students; these findings were consistent with the study conducted by Mary N. Meyer, Helen Connors, et.al[6]. They demonstrated that students who experienced a pediatric simulation curriculum were found to perform better in clinical setting than their peers who had not yet experienced simulation. Rotating students through the simulation laboratory offered additional benefits.

The result of this study also revealed that simulation-based learning was effective in improving knowledge in selected medical conditions i.e. management of myocardial infarction, care of patient on defibrillation, management of MIS-C, preterm newborn care, management of post COVID complications, conduction of normal vaginal delivery; it was also effective to enhance skills in selected medical conditions i.e. management of myocardial infarction, care of patient on defibrillation, management of MIS-C, management of post traumatic stress disorders, management of post-partum haemorrhage, management of antepartum haemorrhage; it was also effective to enhance clinical decision making ability in selected medical conditions i.e. management of myocardial infarction, care of patient on defibrillation, management of MIS-C, management of post-traumatic stress disorders, management of post-partum haemorrhage, preterm newborn care and conduction of normal vaginal delivery. These cases were selected as they would expose students to the same type of patients with medical diagnosis. These findings were similar with the study conducted by Jeffries PR et. Al[10] which evidenced that skills learned and practiced in the simulation setting are transferred to the clinical setting. It is becoming more important for nursing students who entered in clinical area with proficient procedural skills helps to improve the patient's safety. With vast differences in the decision of clinical placement hours across the world, a 25%

and 50 % replacement look different from state by state or institution by institution. If we replace 50% of clinical practice hours with simulation, the students will only be in a clinical area for a minimum decided stipulated hours. Regulation of minimum number of clinical practice hours required to ensure quality graduates who are entering in the health care sectors.

CONCLUSION

The study concluded that simulation based learning and clinical practice were effective in improving the competency (knowledge, skills, clinical decision-making ability) of nursing students. The study also analyzed the effectiveness of different percentage (10%,15%, 20% and 30%) of replacement of clinical hours with simulation. It was found to be significant in medical conditions of medical surgical, child health and mental health nursing. However, it was effective in enhancing post test scores of knowledge, skills, clinical decision-making ability but it was not statistically significant in selected areas of midwifery and obstetrical nursing.

ACKNOWLEDGEMENT

We express our appreciation to the respected officials of the institutes of M.M institutes of M.M (Deemed to be University) Mullana, who cooperated with us for implementing this research. The authors would like to thank all participants who give their valuable time.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICTS OF INTEREST

Nil

REFERENCES

1. Roberts, E., Kaak, V., & Rolley, J. (2019). Simulation to Replace Clinical Hours in Nursing: A Meta-narrative Review. *Clinical Simulation in Nursing*, *37*, 5-13. https://doi.org/10.1016/j.ecns.2019.07.003.
2. Baillie, L., & Curzio, J. (2009). Students' and facilitators' perceptions of simulation in practice learning. Nurse Education in Practice, 9(5), 297-306. https://doi.org/ 10.1016/j.nepr.2008.08.007.
3. Foronda, C., Godsall, L., & Trybulski, J. (2013). Strategies to incorporate virtual simulation in nurse education. Clinical Simulation in Nursing, 10(8), 412-418. https://doi.org/10.1016/j.ecns.2014.03.005.
4. Caroline Larue, Jacinthe Pepin, Emilie Allard. Simulation in preparation or substitution for clinical placement: A systematic review of the literature. 5(9), 132-140. https://doi.org/10.5430/jnep.v5n9p132
5. Tanner C. Transforming prelicensure nursing education: preparing the new nurse to meet emerging health care needs. Nursing Education Perspect,31,347-53. https://doi.org/10.1043/1536-5026-31.6.347
6. Meyer, M.N., Connors, H., Hou, Q., & Gajewski, B. The effect of simulation on clinical performance: A junior nursing student clinical comparison study. Simulation in Healthcare, 65 (5), 269-277. https://doi.org/10.1097/SIH.0b013e318223a048.
7. Brien, L.A, Charette, M., &Goudreau, J. Nursing students' perceptions of the contribution of high- fidelity simulation and clinical placement in a critical care course. Clinical Simulation in Nursing, 13(9), 436-441. https://doi.org/10.1016/j.ecns.2017.05.005.
8. Medley. C., & Horne. C. Educational innovations. Using Simulation technology for undergraduate nursing education. Journal of nursing education. 44(1), 31-34.
9. Bogossian, F, Copper, S., Kelly, M., Levett-Jones, T., McKenna, L., Stark, et.al. Best practice in clinical simulation- are we there yet? Collegian, 25(3), 327-334. https://doi.org/10.1016/j.colegn.2017.09.003
10. Jeffries PR. A framework of designing, implementing, and evaluating simulations used as teaching strategies in nursing. Nurs Educ Perspect 2005; 26: 96-103