



A STUDY TO ASSESS THE EFFECTIVENESS OF SIMULATION BASED LEARNING IN TERMS OF COMPETENCY REGARDING MANAGEMENT OF MULTISYSTEM INFLAMMATORY SYNDROME IN CHILDREN (MIS-C) AMONG NURSING STUDENTS IN SELECTED NURSING COLLEGES OF AMBALA, HARYANA

Ms. Simran Bhatt¹, Dr. Yogesh Kumar², Dr. Kirandeep Dhaliwal^{3*}, Dr. Jyoti Sarin⁴

Abstract

Background: MIS-C is a new and rare disease, simulation can be used an effective method to introduce the disease while providing a safe environment for nursing students to learn the management of MIS-C.

Aim: The aim of the study was to evaluate the effectiveness of Simulation Based Learning Regarding Management of MIS-C.

Methods and Materials: A Quasi Experimental Non-Equivalent Control Group Pre-Test Post Test research design was used in this study. The data was collected by using Structured Knowledge Questionnaire, Objective Structured Clinical Evaluation and Structured Clinical decision making ability Questionnaire.

Results: The result shows that mean post-test knowledge scores (16.24 ± 4.91) were higher than the mean pre-test knowledge scores in experimental group. The mean post-test skill score (23.10 ± 4.08) was higher than the mean pre-test skill scores in experimental group and the mean post-test clinical decision making ability score (6.93 ± 2.08) was higher than the mean pre-test clinical decision making ability score in experimental group. There was a low positive correlation between post test knowledge and clinical decision making ability score and low correlation between post test knowledge and post test skill score in Experimental group.

Conclusion: Simulation based learning was effective to improve the competency in terms of knowledge, skills, clinical decision making ability of MIS-C among nursing students.

Keywords: Effectiveness, Knowledge, skill, clinical decision making ability, Simulation Based Learning, Multisystem Inflammatory Syndrome (MIS-C)

¹ MSc Nursing Student, Child Health Nursing Department, MM College of Nursing, Maharishi Markandeshwar (Deemed to be University), Ambala, Haryana, India.

² RN, RM, MN, PhD (Nursing), HOD Child Health Nursing Department, Principal MM Institute of Nursing, Maharishi Markandeshwar (Deemed to be University), Ambala, Haryana, India.

³ RN, RM, MN, PhD (Nursing), HOD Mental Health Nursing Department, Vice Principal MM College of Nursing, Maharishi Markandeshwar (Deemed to be University), Ambala, Haryana, India.

⁴ RN, RM, MN, PhD (Nursing), Director- Principal, MM College of Nursing, Maharishi Markandeshwar (Deemed to be University), Ambala, Haryana, India.

Correspondence Author: Dr. Kirandeep Dhaliwal

RN, RM, PhD Nursing, HOD Mental Health Nursing Department, Vice Principal MM College of Nursing, Maharishi Markandeshwar (Deemed to be University), Ambala, Haryana, India.

Postal Address: M.M. College of Nursing, Maharishi Markandeshwar (Deemed to be university), Mullana, Ambala, Haryana, India.

DOI: - 10.48047/ecb/2023.12.si10.00382

Introduction

In recent years COVID-19 has become a popular disease, spreading rapidly from its peak in Wuhan City of China to other parts of the world.¹ As per WHO report, India has recorded 40,622,709 confirmed cases of COVID-19 with 492,327 deaths until 28 January 2022. The individuals falling below the age of 18 years are being infected with this virus but they still are less in number as compared to Middle age and elderly people. Statistics collected from countries in Asia, Europe, and North America show that child cases account for 2.1–7.8% of confirmed COVID-19 cases.²

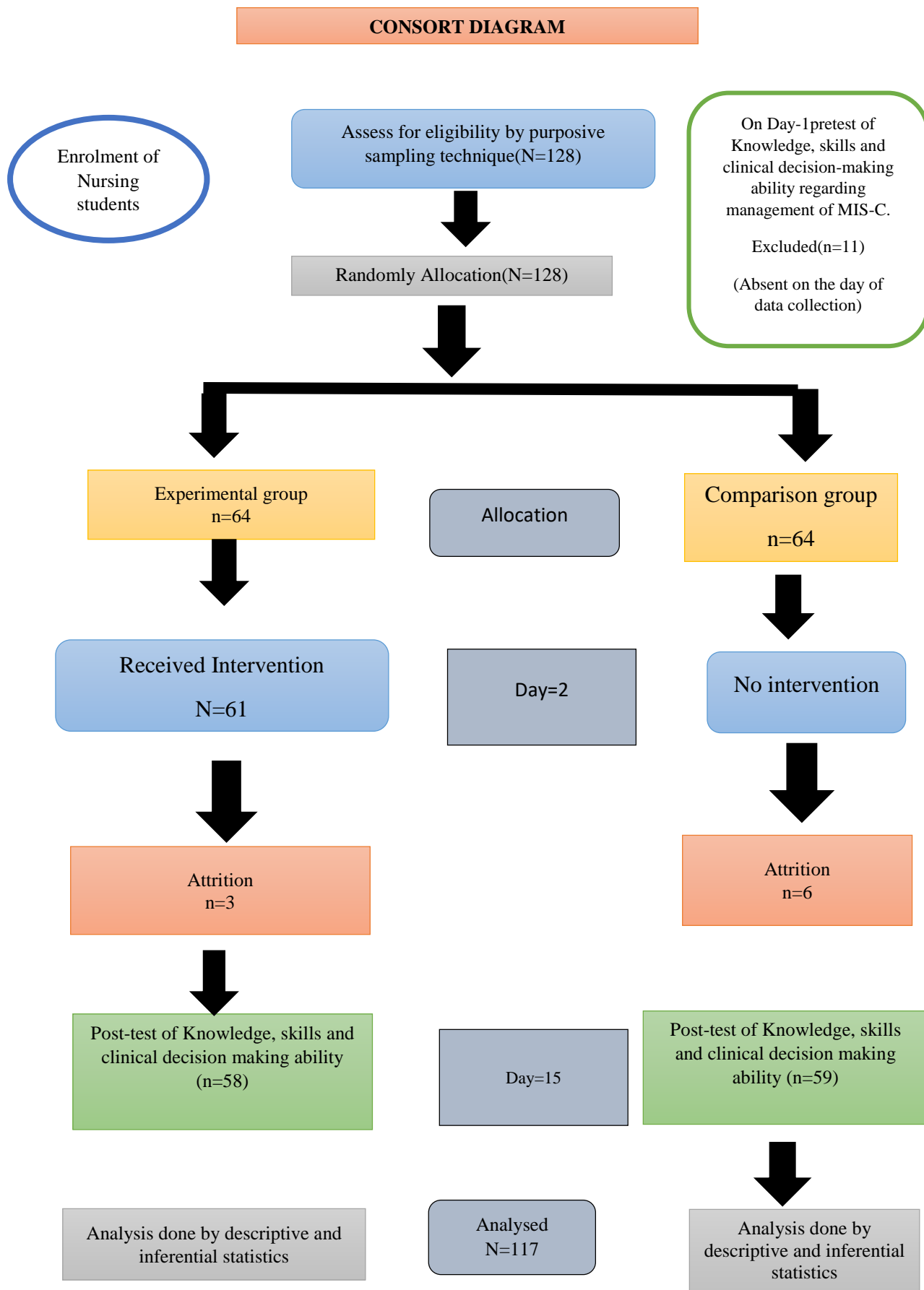
Towards the end of April 2020, reports came from the United Kingdom that eight previously healthy children were showing COVID-19 symptoms including fever, shock and hyperinflammation. The disease was critical in children and it was only after the Pediatric Inflammatory Multisystem Syndrome group was temporarily associated with SARSCoV-2 (PIMS-TS). It was only after this that an increase in the number of PIMS-TS cases was observed. More names for this disease are Multisystem Inflammatory Syndrome in Children (MIS-C), Kawasaki syndrome (KD), Kawasaki-like syndrome, or toxic shock syndrome (TSS). However, only <100 cases of PIMS-TS or MIS-C have been reported from India to date.³

A study was conducted to teach residents, paediatric emergency medicine fellows, and advanced practice providers who care for children to recognize and manage MIS-C and associated sequelae while applying the basic principles of paediatric resuscitation. The simulation case was based on a real patient who presented to the emergency department with fever, rash, and

cardiogenic shock. The scenario used a high-fidelity school-age mannequin in an emergency centre resuscitation room or simulation lab. The case took 25 minutes to run, followed by a 15- to 20-minute debrief session. Personnel required for the case included a simulation technician, case instructor, emergency department nurse, parent, and consultant. Learners had to recognize the syndrome and treat the resultant shock and arrhythmia with a combination of vasopressors, antiarrhythmics, and defibrillation. Afterward, learners participated in a formal debriefing session and completed a written evaluation. The results of this study were Twenty-five learners (six paediatric emergency medicine fellows, 12 residents, and seven advanced practice providers) participated in the scenario over a 3-month period. The written evaluation was completed by 20 of the 25 participants; all 20 felt their confidence, comfort, and knowledge regarding the topic had increased, with an average score of 5 (strongly agree) on a 5-point Likert scale. This study concluded that simulation case offers an effective experience for learners to become comfortable and confident in recognizing and managing MIS-C.⁴

Methodology

The research design adopted for the study was Quasi Experimental Non-Equivalent Control Group Pre-Test Post Test Design. A total of 117 nursing students (58 in experimental group and 59 in comparison group) were selected by using Non probability purposive sampling technique. The study was conducted in M. M. College of Nursing and M. M. Institute of Nursing, Ambala, Haryana. The aim of the study was to evaluate the effectiveness of Simulation Based Learning Regarding Management of MIS-C.



post-test competency scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students between experimental group and comparison group.

H_{1a}: There will be a significant difference in mean post-test knowledge scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students between experimental group and comparison group at 0.01 level of significance.

H_{1b}: There will be a significant difference in mean post-test skills scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students between experimental group and comparison group at 0.05 level of significance.

H_{1c}: There will be a significant difference in mean post-test clinical decision making scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students between experimental group and comparison group at 0.01 level of significance.

H₂: There will be a significant difference in mean Pre-test & post-test competency scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students in experimental group and comparison group.

H_{2a}: There will be a significant difference in mean Pre-test & post-test knowledge scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students in experimental group and comparison group at 0.01 level of significance.

H_{2b}: There will be a significant difference in mean Pre-test & post-test skills scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students in experimental group and comparison group at 0.05 level of significance.

H_{2c}: There will be a significant difference in mean Pre-test & post-test clinical decision making ability scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students in experimental group and comparison group at 0.01 level of significance.

H₃: There will be a significant relationship between knowledge, skills and clinical decision making ability scores regarding management of multisystem inflammatory syndrome in children (MIS-C) among nursing students between experimental group and comparison group at 0.05 level of significance.

Tools and techniques

The data was collected by using Selected Variables, Structured Knowledge Questionnaire, Objective Structured Clinical Evaluation and Structured Clinical decision making ability Questionnaire. The reliability of the tool was checked using KR20 for Structured Knowledge Questionnaire (0.8) and Structured Clinical decision making ability Questionnaire (0.7) and inter-rater reliability was used for Objective Structured Clinical Evaluation (0.7). The analysis of the present study was done by descriptive and inferential statistics by using SPSS version 20.

Researcher had used google form to collect the information regarding selected variables of nursing students. Learning Management System (LMS) was used for Structured Knowledge Questionnaire and Structured Clinical decision making ability Questionnaire regarding management of MIS-C.

Description of data collection tools

Section I: Development and description of Selected Variables

Selected Variables comprised of 4 items seeking information on personal data such as age, gender, previous cumulative sessional marks in child health nursing and Clinical evaluation marks in child health nursing

Section II: - Development and description of structured knowledge questionnaire

Structured knowledge questionnaire was developed to assess knowledge of nursing students regarding management of MIS-C. The test items were objective type. All the 30 items were multiple choice questions. Each item had a single correct answer. Every correct answer was accorded a score of one point and every wrong answer assigned zero score. Thus, the maximum score was 30 on the structured knowledge questionnaire. Technique for data collection was E-filling.

Section III: - Development and description of Objective Structured Clinical Examination (OSCE) Checklist

Objective Structured Clinical Examination (OSCE) Checklist was developed to assess the skills of

nursing students regarding management of MIS-C. Objective Structured Clinical Examination (OSCE) consisted of total 42 steps (under main items sub-items were included). Each correct skill was awarded as a score of one and every wrong skill was awarded as a score of zero. Thus, the total score on OSCE ranged from 0-42. Maximum possible score was 42 and minimum score was zero

Section III: - Development of Clinical Decision Making Ability Questionnaire

Structured Clinical Decision Making Ability questionnaire was developed to assess clinical decision making ability of nursing students regarding management of MIS-C. The questionnaire was composed of 3 case scenarios with 5 questions in each. The test items were objective type. All the 15 items were multiple choice questions. Each item had a single correct answer. Every correct answer was accorded a score of one point and every wrong answer assigned zero score. Thus, the maximum score was 15 on the structured knowledge questionnaire. Technique for data collection was E-filling.

Result

The result shows that mean post test knowledge scores (16.24±4.91, 13.56±4.69) was higher than

the mean pretest knowledge scores (11.79±3.30, 11.73±3.90) in experimental and comparison group respectively. The mean post test skill score (23.10±4.08, 19.92±5.26) was higher than the mean pre- test skill scores (12.05±4.09, 12.97±4.88) in experimental and comparison group and the mean post-test clinical decision making ability score (6.93±2.08, 6.92±2.26) was higher than the mean pre test clinical decision making ability score (6.26±2.12, 6.47±2.22) in experimental and comparison group There was statistically low positive correlation between pre-test knowledge and pre-test Clinical Decision Making Ability score and negligible correlation between pre-test knowledge and pre-test skills score (r=0.33, p=0.00), (r=0.25, P=0.05) respectively. There was a low positive correlation between post test knowledge and CDMA score (r=0.43, p=0.00) and low correlation between post test knowledge and post test skill score (r=0.23, p=0.07) in Experimental group. In the comparison group the pre-test knowledge and pre-test Clinical Decision Making Ability scores and pre-test Skills score have low positive correlation (r=0.39, p=0.00) (r=0.33, p=0.00) respectively. The post test knowledge score has low positive correlation with Clinical Decision Making Ability and Skills score (r=0.44, p=0.00) (r=0.44, p=0.00) at 0.05 level of significance.

Table 1.1 Chi Square showing Comparison, Frequency Percentage Distribution in terms of Selected Variables among Nursing Students in Experimental and Comparison Group
N=117

Selected Variables	Experimental group (n=58) f (%)	Comparison group (n=59) f (%)	χ^2	Df	p value
1. Age					
1.1 19-21yrs	54(93.10%)	48(81.35%)	5.21	1	0.39 ^{NS}
1.2 22-24yrs	04(6.89%)	11(18.6%)			
2. Gender					
2.1 Male	16(32.27%)	14(23.72%)	0.22	1	0.63 ^{NS}
2.2 Female	42(72.41%)	45(76.27%)			
3. Previous cumulative sessional marks in Child Health Nursing					
3.1 Pass (>37.5)	23(39.65%)	33(55.93%)	3.10	1	0.07 ^{NS}
3.2 Fail (<37.5)	35(60.34%)	26(44.06%)			
4. Clinical evaluation marks in child health nursing					
4.1 0-25	40(68.96%)	32(54.23%)	2.68	1	0.10 ^{NS}
4.2 26-50	18(31.03%)	27(45.76%)			
NS Not significant (p>0.05)		*Significant(p<0.05)		$\chi^2 (1) = 3.84$	

Data presented in table 1.1 depicts the frequency and percentage distribution of nursing students and chi-square value showing comparison of

experimental group and comparison group in terms of selected variables among nursing students.

Table 1.2 Range, Mean, Standard Deviation and Median of Post-test Knowledge Scores Regarding Management of MIS-C among Nursing Students in Experimental and Comparison Group
N=117

Variables	Group	Range	Mean+ SD	Median
Knowledge	Experimental Group (n= 58)	5-26	16.24±4.91	17
	Comparison Group (n= 59)	4-24	13.56±4.69	13

Minimum Score: 00

Maximum Score: 30

Data presented in table 1.2 shows the standard deviation of knowledge scores of the nursing students was more in experimental group than the

comparison group, which means the knowledge scores were more homogeneous in comparison group than the experimental group.

Table 1.3 Mean Rank U and Z Value of Post-test Knowledge Scores regarding Management of MIS-C among Nursing Students in Experimental and Comparison Group
N=117

Variable	Group	Mean Rank	U value	Z value	p value
Knowledge	Experimental group (n=58)	68.07	1185.00	-2.87	0.00*
	Comparison group (n=59)	50.08			
^{NS} Not significant(p>0.01)			*Significant (p<0.01)	Z= -2.57 to 2.57	

Data presented in table 1.3 shows that both the groups were found to be statistically significant (p=0.00) in terms of knowledge at 0.01 level of significance this was a true difference but not by chance.

Hence, research hypothesis H_{1a} accepted and null hypothesis H_{01a} was rejected. It further inferred that simulation based learning was effective to improve the knowledge regarding management of MIS-C among nursing students.

Table 1.4 Range, Mean, Median and Standard Deviation of Post-test Skills Scores regarding Management of MIS-C among Nursing Students in Experimental and Comparison Group
N=117

Variables	Group	Range	Mean+ SD	Median
Skills	Experimental Group (n= 58)	15-35	23.10±4.08	23
	Comparison Group (n= 59)	8-34	19.92±5.26	20

Minimum score:00

Maximum score: 42

Data presented in table 1.4 shows that standard deviation of skill scores of nursing students in experimental group was higher than comparison group, which means the skill scores was more

homogenous in experimental group than the comparison group regarding management of MIS-C.

Table-1.5 Mean, Standard Deviation, Mean Difference and Standard Error of Mean Difference and “t” value of Pre-test and Post-test Skill scores regarding Management of MIS-C among Nursing Students in Experimental and Comparison group
N= 117

Group		Mean+ SD	M _D	SE _{MD}	t Value	df	p value
Experimental group (n=58)	Pre-test	12.05±4.09	-11.05	0.59	18.53	57	0.00*
	Post-test	23.10±4.08					
Comparison group N=59	Pre-test	12.97±4.88	-6.94	0.82	8.44	58	0.00*
	Post-test	19.92±5.26					
^{NS} Not Significant (p>0.05)			*Significant(p<0.05)				t(57, 58)=2.0

Data presented in table 1.5 shows that research hypothesis H_{2b} was accepted and null hypothesis H_{02b} was rejected, which states, that simulation

based learning was effective to enhance the skills in experimental group regarding management of MIS-C among nursing students.

Table 1.6 Range, Mean, Median and Standard Deviation of Post-test Clinical Decision Making Ability scores regarding management of MIS-C among Nursing Students in Experimental and Comparison Group N=117

Variables	Group	Range	Mean \pm SD	Median
Clinical Decision Making Ability	Experimental Group (n= 58)	0-11	6.93 \pm 2.08	7
	Comparison Group (n= 59)	2-12	6.92 \pm 2.26	7

Minimum score: 00 **Maximum score: 15**

Data presented in table 1.6 shows that the standard deviation of clinical decision making ability scores of the nursing students was lower in experimental group than the comparison group, which means the

clinical decision making ability scores were more homogeneous in experimental group than the comparison group.

Table – 1.7 Mean Rank U and Z Value of post-test Clinical Decision Making Ability Scores regarding Management of MIS-C among Nursing Students in Experimental and Comparison Group N=117

Variable	Groups	Mean Rank	U value	Z value	p value
Clinical Decision Making Ability	Experimental group (n=58)	59.03	1709.50	0.00	0.00*
	Comparison group (n=59)	58.97			

NS Not Significant ($p>0.01$) *Significant ($p<0.01$) Z= -2.57 to 2.57

Data presented in table 1.7 shows the calculated 'U' value was found to be 1709.50 and Z value 0.00. Both the group were found to be statistically significant ($p=0.00$) in terms of clinical decision making ability at 0.01 level of significance.

It further inferred that simulation based learning was effective to improve the clinical decision-making ability regarding management of MIS-C among nursing students.

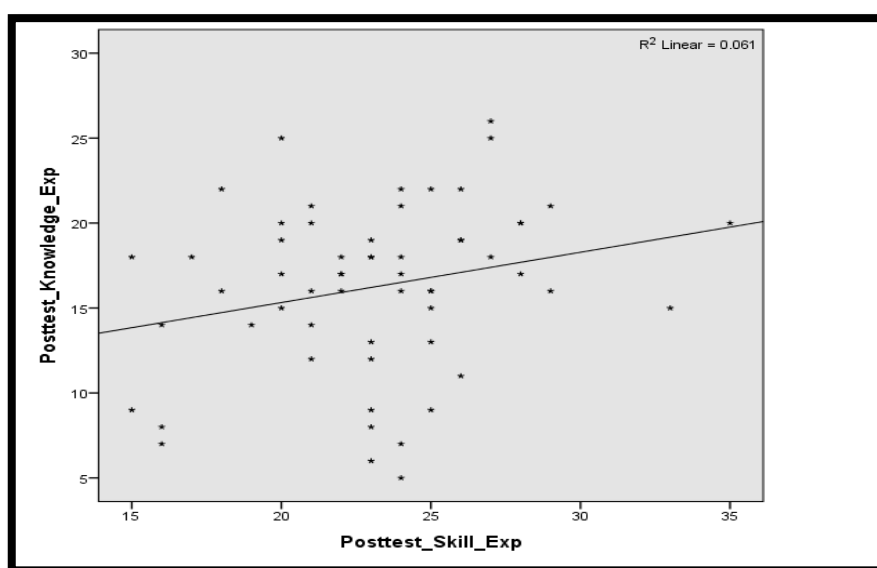


Figure 1.2: Scatter Diagram Showing Correlation between post-test of Knowledge and Skill Scores of nursing students in Experimental Group

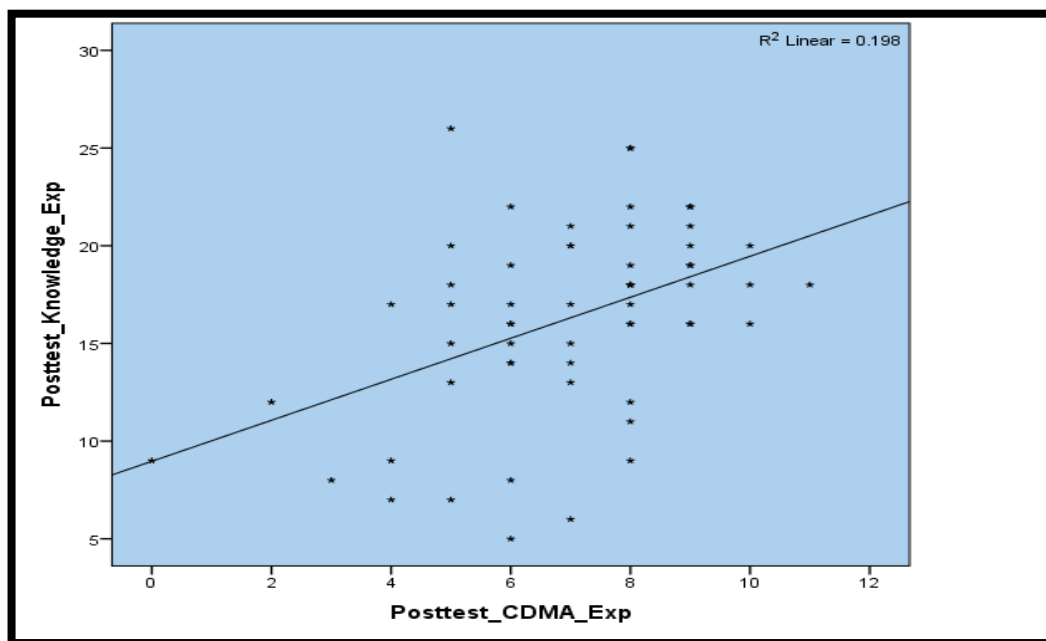


Figure 1.3: Scatter Diagram Showing Correlation between post-test of Knowledge and Clinical Decision Making Ability Scores of nursing students in Experimental Group

Discussion

The findings of the study were discussed with reference to the results obtained in other related research studies.

Findings related to description of Selected Variables of Nursing Students Comparing the Experimental and Comparison group

In the present study, maximum number of nursing students (72.41%) and (76.27%) were females in experimental and comparison group respectively. These findings were consistent with the study conducted by Rabori et al. (2021)⁵ and Haukedal et al. (2018)⁶ in which the number of female participants was more than the male participants.

Findings related to effectiveness of simulation based learning in terms of knowledge of Nursing Students Comparing the Experimental and Comparison group.

In this study the showed significant difference between the post test knowledge scores of experimental and comparison group. The findings are consistent with the study conducted by Tawalbeh et al. (2020)⁷ that also showed significant difference between the post test knowledge scores of experimental and comparison group regarding effectiveness of simulation.

In this study the comparison group received conventional teaching and they showed a significant improvement in their competency scores but the experimental group showed even better scores. This finding is consistent with the

study done by Tawalbeh et al (2020)⁷ which shows that comparison group had increased knowledge after conventional teaching but the knowledge in the experimental group who received simulation based teaching was more than that of comparison group.

Findings related to effectiveness of simulation based learning in terms of skills of Nursing Students Comparing the Experimental and Comparison group.

In the present study, the skill scores after the administration of simulation based learning program Mean Post-test Skills score among Nursing Students was found to be 23.10 ± 4.08 in Experimental group and 19.92 ± 5.26 in Comparison group. Independent t-test was applied and significant pre-test post test difference was observed at $p=0.05$ level of significance. These findings were consistent with Rabori et al. (2021)⁵ in which Mean Post-test Skills score among Nursing Students was found to be 141.6 ± 3.13 in Experimental group and 109.36 ± 4.71 in Comparison group. Independent samples t-test showed a statistically significant difference between the two groups after the intervention ($P < 0.05$).

In this study the experimental group showed a significant increase in knowledge and skills scores than that of comparison group. This is consistent with the findings of a study by Tawalbeh et al (2014)⁸

Findings related to effectiveness of simulation based learning in terms of clinical decision making ability of Nursing Students Comparing the Experimental and Comparison group.

In the present study difference in the scores between the pre test and post test clinical decision making ability scores was computed by Wilcoxon test experimental group were found to be statistically significant ($p=0.01$) at 0.01 level of significance and these findings were supported by Alamrani et al (2018)⁹ who reported that critical thinking score was computed by Wilcoxon test experimental group were found to be statistically significant ($p=0.00$) at 0.01 level of significance.

The present study focused on improving competency of the nursing students regarding the management of MIS-C. This is congruent with a study by Gurkha D et al (2021)⁵ who ran a simulation case scenario for 25 emergency room staff included doctors and staff nurses for managing MIS-C and the study helped in increasing competency of the learners which was consistent with this research study findings.

The results of this study are consistent with the results of many previous studies. Most studies showed that simulation has a positive effect on improving knowledge, skills and confidence Goldenberg et al (2005)¹⁰ and also increasing competency and critical thinking Bruce et al (2009)¹¹. The differences between the comparison and experimental groups may be related to effect of repeated practice in a situation resembling the real situation, in addition to effect of integrating visual and auditory methods to learning Steadman et al (2006)¹²

Limitation

The study was done on a small sample so generalization cannot be done

Conclusion

It can be concluded that simulation based learning was effective to improve the competency in terms of knowledge, skills, clinical decision making ability of Multisystem Inflammatory Syndrome in Children among nursing students.

Recommendations

- A study can be replicated on a large sample of nursing students for wider generalization of findings.
- A study can be carried out on nursing staff to assess their competency regarding Management of MISC.

- A comparative study can be conducted to find out the effectiveness of simulation based learning with in two colleges in terms of competency regarding Management of MISC.

Implications

The findings of the study have several implications on nursing practice, nursing administration, nursing education and nursing research.

Nursing Practice

- Nursing teachers have to develop a schedule for practice session to educate nursing students to gain their competency. The use of simulation based learning, demonstration and planned teaching information material for nursing students and staff nurses to supplement verbal information, increase knowledge, skills, clinical decision making ability and competency.

Nursing Administration

- Nursing administrators should have plan and organize training programme including simulation based learning for nursing students and staff nurses regarding Management of MIS-C. The nurse administrator can organize and conduct In-service education and continuing nursing education for staff nurses in order to enhance their knowledge and keep them aware of the latest advancements in technology to provide quality of care on patients. The nurse administrator should be able to plan, organize and conduct health education program on causes and management of MISC. The nursing administrators should take part in the developing protocols related to designing the health education programs and strategies on management of MIS-C.

Nursing Education

- Nursing education helps the students with adequate knowledge and skills to fulfil their duties and responsibilities in the nursing field. Nurse educator has to pay more attention on training of nursing students regarding management of MIS-C. Nursing teachers can be motivated to organize demonstration and teaching programs to enhance the knowledge and practice of nursing students regarding management of MIS-C.

Nursing Research

- Nursing research is an essential aspect of nursing as it uplifts the profession and develops new nursing norms and body of knowledge. Based on the findings, the professionals and nursing students can conduct further studies on various aspects of Management of MIS-C and its importance and impacts on health, community and surroundings in order to assess the knowledge of staff nurses. The study will motivate the beginning researchers to conduct similar study in large scale and on a comparative basis it also motivates young and enthusiastic researchers to implement simulation based learning and see its effectiveness.

Ethical Permission

The ethical permission was obtained from the ethical committee of Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India.

Funding

The article has not been funded from any source.

References:

1. Singhal, T. (2020) "A review of Coronavirus disease-2019 (COVID-19)," *Indian journal of pediatrics*, 87(4), pp. 281–286. doi: 10.1007/s12098-020-03263-6.
2. Jiang, L. et al. (2020) "COVID-19 and multisystem inflammatory syndrome in children and adolescents," *The Lancet infectious diseases*, 20(11), pp. e276–e288. doi: 10.1016/S1473-3099(20)30651-4.
3. Angurana, S. K. et al. (2021) "Intensive care needs and short-term outcome of multisystem inflammatory syndrome in children (MIS-C): Experience from North India," *Journal of tropical pediatrics*, 67(3), p. fmab055. doi: 10.1093/tropej/fmab055.
4. Gurkha, D. et al. (2021) "Coronavirus-19 multisystem inflammatory syndrome in children (MIS-C): A pediatric simulation case for residents, fellows, and advanced practice providers," *MedEdPORTAL: the journal of teaching and learning resources*, 17, p. 11180. doi: 10.15766/mep_2374-8265.11180.
5. Mehdipour-Rabori, R., Bagherian, B. and Nematollahi, M. (2021) "Simulation-based mastery improves nursing skills in BSc nursing students: a quasi-experimental study," *BMC nursing*, 20(1), p. 10. doi: 10.1186/s12912-020-00532-9.
6. Haukedal, T. A. et al. (2018) "The impact of a new pedagogical intervention on nursing students' knowledge acquisition in simulation-based learning: A quasi-experimental study," *Nursing research and practice*, 2018, p. 7437386. doi: 10.1155/2018/7437386.
7. Tawalbeh, L. I. (2020) "Effect of simulation modules on Jordanian nursing student knowledge and confidence in performing critical care skills: A randomized controlled trial," *International journal of Africa nursing sciences*, 13(100242), p. 100242. doi: 10.1016/j.ijans.2020.100242.
8. Tawalbeh, L., & Tubaishat, A. (2014). Effect of Simulation on Knowledge of Advanced Cardiac Life Support, Knowledge Retention, and Confidence of Nursing Students in Jordan. *Journal of Nursing Education*, 53, 38-44. - references - scientific research publishing (no date) Scirp.org. Available at: [https://www.scirp.org/\(S\(1z5mqp453edsnp55rrgjct55\)\)/reference/referencespapers.aspx?referenceid=2861374](https://www.scirp.org/(S(1z5mqp453edsnp55rrgjct55))/reference/referencespapers.aspx?referenceid=2861374) (Accessed: August 10, 2022).
9. Alamrani, M. H. et al. (2018) "Comparing the effects of simulation-based and traditional teaching methods on the critical thinking abilities and self-confidence of nursing students," *The journal of nursing research: JNR*, 26(3), pp. 152–157. doi: 10.1097/jnr.0000000000000231.
10. Goldenberg, D., Andrusyszyn, M.a. and Iwasiw, C. (2005) The Effect of Classroom Simulation on Nursing Students' Self-Efficacy Related to Health Teaching. *Journal of Nursing Education*, 44, 310-314. - references - scientific research publishing (no date) Scirp.org. Available at: [https://www.scirp.org/\(S\(1z5mqp453edsnp55rrgjct55\)\)/reference/referencespapers.aspx?referenceid=2487166](https://www.scirp.org/(S(1z5mqp453edsnp55rrgjct55))/reference/referencespapers.aspx?referenceid=2487166) (Accessed: August 10, 2022).
11. Bruce, S. A. et al. (2009) "A collaborative exercise between graduate and undergraduate nursing students using a computer-assisted simulator in a mock cardiac arrest," *Nursing education perspectives*, 30(1), pp. 22–27. Available at: <https://pubmed.ncbi.nlm.nih.gov/19331035/> (Accessed: August 10, 2022).
12. Steadman, R.H., Coates, W.C., Huang, Y.M., Matevosian, R., Larmon, B.R., McCullough, L. and Ariel, D. (2006) Simulation-based training is superior to problem-based learning for the acquisition of critical assessment and management skills. *Critical Care Medicine*, 34,

151157.doi10.1097/01.CCM.0000190619.42013.94 - References - Scientific Research Publishing (no date) Scirp.org. Available at: [https://www.scirp.org/\(S\(i43dyn45teexjx455qlt3d2q\)\)/reference/referencespapers.aspx?referenceid=765588](https://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/referencespapers.aspx?referenceid=765588) (Accessed: August 10, 2022).