

The Effects of Emergency Clinical Practicum at School During the Covid-19 Pandemic

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Abstract

Background: Clinical practicum at emergency department has been suspended during the coronavirus pandemic. Development of innovative clinical education pedagogies is crucial for improving the emergency care knowledge for nursing students, especially those who did not have chance for clinical placement in accident and emergency department.

Objective: This quasi-experimental study was to determine whether a hybrid use of flipped classroom and high-fidelity simulations could enhance the knowledge, attitudes, motivation and satisfaction of undergraduate nursing students toward the emergency clinical learning in this critical period.

Methods: Three hundred and twenty-two year 4 and 5 undergraduate nursing students were provided with 160 hours of online flipped lectures and high-fidelity simulations. Emergency nursing knowledge of nursing students was tested via multiple choice questions pre- and post-programme. The attitude, motivation and satisfaction with the programme were also measured after the programme was finished.

Results: The mean post-test knowledge scores were statistically significantly higher than the pre-test in basic life support nursing, advanced care life support nursing, trauma and disaster nursing, triage nursing and medical and surgical emergency nursing. Additionally, the scores indicated that the students generally had a positive attitude, motivation and satisfaction towards the hybrid teaching methods.

Conclusions: The findings of this study support the implementation of the hybrid teaching methods for clinical learning, as it motivates students and develops their confidence over a short clinical learning period. Further development of innovative clinical education pedagogies is crucial to maintain students' clinical competences when clinical practicum is not allowed beyond the pandemic.

Keywords: Emergency, Flipped Classroom, Nursing, Pandemic, Simulation

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has had a tremendous effect on nursing education [1, 2]. While the World Health Organization has recommended social distancing and 'stay-at-home' preventive measures to minimise the spread of coronavirus (COVID-19), clinical practicum at universities have been suspended during the pandemic. The policy of clinical practicum suspension has affected the learning of nursing students, especially senior students who are about to graduate. To enhance undergraduate nursing students' clinical competencies before their graduation, an alternative teaching method to onsite clinical placement is urgently needed.

The combination of a flipped classroom and high-fidelity simulations may be an alternative strategy to onsite accident and emergency department (AED) placement¹. Flipped classroom learning enhances students' awareness of their own learning needs and engages them in pre-reading and self-evaluation via online learning materials¹, while high-fidelity simulation enhances students' knowledge, motivation and attitude towards clinical learning, and prepares them for engagement in clinical learning [3]. A combination of these two teaching pedagogies has been reported to bring real-life clinical situations to the classroom for clinical training. Previous studies have also shown that students benefit from the combination of a flipped classroom and simulations as it improves their results in early nursing assessments and their ability to implement nursing interventions for patients with acutely deteriorating situations [4]. However, there remains a lack of consensus on how to best construct and implement such alternative teaching methods in AED training, and whether such teaching methods can effectively increase nursing students' knowledge, motivation and satisfaction and improve their attitude during the time of clinical placement suspension.

2. Purpose

This study tested the effectiveness of an innovative emergency education programme by measuring students' knowledge of and attitude towards emergency practice, motivation for learning in simulated laboratories and satisfaction with the education programme. If proven successful, this study may address the knowledge gap in using simulation-assisted learning models to develop critical care skills, impart knowledge and prepare students to deal with the complex acute care situations that they are expected to face as registered nurses in the future.

3. Materials and Methods

3.1. Design

This was a quasi-experimental pre-test post-test study. An alternative AED clinical practicum programme was provided to year 4 and 5 Bachelor of Nursing students. The students' self-reported attitude, motivation and satisfaction toward the programme were evaluated upon its completion. The students' knowledge about emergency nursing was tested pre- and post-training.

3.1.2. Setting

The study was conducted at the School of Nursing at a university

in Hong Kong from December 2021 to September 2022.

3.1.3. Participants

Three hundred and twenty-two year 4 and 5 nursing students participated in the alternative AED clinical practicum programme, which consisted of flipped online lectures and a high-fidelity simulation. Nursing students were included if (1) they had not previously attended AED clinical training, (2) they had not worked in the AED as a temporary undergraduate nursing student and (3) they agreed to participate in the study. Students were divided into small groups, with eight students per group, to participate in the skills-based workshops and simulations.

3.1.4. Sample size

The calculation of sample size is based on a sensitivity to change for the knowledge acquired with the simulation equal to 0.58. Knowledge scores of 6.5 differences are anticipated to be detected⁵. Assuming an alpha level of 0.05, a power of 0.8, a sample size of 300 students was required.

3.1.5. Procedure

The programme consisted of the following seven topics: basic life support nursing, advanced care life support nursing, trauma and disaster nursing, triage nursing, medical and surgical emergency nursing, paediatric emergency nursing and psychiatric emergency nursing. There were 80 hours of online lectures exploring theoretical aspects related to each topic, and 80 hours of skills-based workshops and simulations. Subsequent to the theoretical input, the nursing students were assigned to practice in AED simulation sessions to align their theoretical knowledge with their nursing skills based on current hospital guidelines.

The theoretical input was composed of emergency management of cardiopulmonary arrest, updated guidelines for basic and advanced life support care for paediatric and adult patients, management of pre-hospital and during-hospital trauma cases and current management guidelines for handling a client with suicidal thoughts. In addition, the theoretical training included nursing therapeutics and triage assessment of crisis interventions for clients with a negative prognosis.

The nursing students were assigned to small groups and worked together on the high-fidelity simulation scenarios that related to an emergency situation, including caring of patients with pneumothorax, acute pulmonary oedema, car accident, gun shot, and acute stroke. They were encouraged to work as a team and prioritise the patients' problems, plan and implement nursing interventions, and evaluate the outcomes of the patients. During the simulated clinical activity, facilitators, who are lecturers and Assistant Professors in school, guided and supervised the students throughout the learning process. The facilitators asked questions to prompt critical thinking by the students (Fung, et al., 2021), and provide constructive feedback on their performance during a debriefing session after every simulation and skills-based workshop to enhance students' practical performance competency and optimise their learning.

4. Instruments

The study used four instruments. A multiple-choice question (MCQ) knowledge test with four answer options was used as an objective tool to investigate the effectiveness of the programme. The maximum score for each theoretical topic was 50. A higher score indicated greater knowledge of AED nursing. The Simulation-Based Education and Attitudes Scale (SBEAS) was used to measure the attitudes of nursing students towards the programme. The SBEAS is a tool comprising 18 items that are rated using a 5-point Likert scale. The tool has good psychometric properties, with the following four sub-dimensions: (1) self-confidence, (2) self-efficacy, (3) fidelity and (4) difficulty. The maximum score for each question is 5. The reliability coefficient of the SBEAS instrument was 0.72. Moreover, students' experiences and satisfaction with the programme were measured using a 7-point stimulation (SIMS) scale and a 5-point Likert student satisfaction scale. A higher score indicated a more positive attitude, greater motivation for and greater satisfaction with the programme.

5. Data collection

Students were required to complete the MCQ knowledge test before and after the programme by Qualtrics, a platform that enables the student to complete the test online without using a paper. They also completed the SBEAS, SIMS, and satisfaction scale after the programme was finished.

5.1. Data analysis

Data analyses were conducted using SPSS, version 26 (SPSS Inc, Chicago, IL, USA; 2018). Demographic data and the results of SBEAS, SIMS, and satisfaction scale are described using percentages, medians, means and standard deviations (SDs). The paired t-test was used to compare data between pre- and post-test, with the significance level set at $p < 0.05$. Intention-to-treat approach was adopted to handle the missing data, if any.

6. Ethical considerations

The students' and facilitators' participation in the study was voluntary. They were informed at the beginning of the clinical training programme that they could withdraw from the study at any time without prejudice. All participants consented to completing the questionnaires via Qualtrics. To maintain strict confidentiality, the name of participants was coded and anonymised.

7. Result

Three hundred and twenty-two students participated in the study. The mean age of the students was 22.56 (SD = 0.79) years, and 55.9% of them had previously visited the AED to seek a medical consultation. None of the participating students had previously participated in a clinical practicum in the AED (Table 1).

	Total (n=322)		
	Mean (SD) Median (range)	N	Percentage (%)
Age	22.56 (0.79) 22 (4)		
Working as Temporary Undergraduate Nursing Student (TUNS) in AED	Yes	0	0%
	No	322	100%
I have been to AED because of seeking medical consultation	Yes	180	55.90%
	No	142	44.09%
I have been to AED because of undergo a clinical practicum	Yes	0	0%
	No	322	100%

Table 1: Students' demographic characteristics and experience of AED clinical learning

6.1. MCQ knowledge scores

The pre-test and post-test MCQ knowledge scores were compared using a paired t-test. Depending on the topics, the mean pre-test knowledge scores were from 17.55 to 32.86 (SD = 9.95-16.11), while the mean post-test knowledge scores were statistically significantly higher from 20.54 to 39.39 (SD = 7.49-12.54; $p < .001$ -0.03) (Table 2).

Learning & Teaching Component	Total (n)	Pre-test		Post-test		p-value
		Mean	(SD)	Mean	(SD)	
BLS Nursing	147	24.9	16.11	32.38	11.72	<.001**
ACLS Nursing	147	32.86	10.79	39.39	8.54	<.001**
Trauma and Disaster Nursing	147	17.55	10.04	20.54	9.99	.01*
Triage Nursing	147	19.05	9.95	25.78	7.49	<.001**
Medical and Surgical Emergency Nursing	265	21.96	12.61	23.96	12.54	.03*
Paediatric emergency Nursing	265	41.06	8.90	40.19	9.43	.14
Psychiatric emergency Nursing	265	39.06	11.91	38.64	11.79	.56
Total score	147	204.76	38.52	229.80	37.33	<.001**
Note: *Statistically significant as it is < .05; **Statistically significant as it is < .01						

Table 2: Baseline and post-intervention outcomes on knowledge MCQs

6.1.2. SBEAS scores

The SBEAS scores indicated that the students were satisfied with the programme regarding to the sub-dimensions of 'self-confidence', 'self-efficacy', 'fidelity' and 'difficulty' (Table 3). The students generally had a positive attitude and motivation towards

the use of the high-fidelity simulation. The students agreed that the learning and teaching strategies used in the high-fidelity simulations were effective and that the programme helped them identify their shortcomings (mean = 3.95 out of 5; SD = 0.53).

SBEAS score		Total (n)	Mean	(SD)
Statement	SBEAS Total Score (not reversed)	322	64.19	6.56
	SBEAS Total Score (reversed)	322	66.06	8.20
Self- confidence	1. SBE allows me to participate to clinical practices actively.	321	3.70	.65
	2. SBE increases my self-confidence in clinical practices.	321	3.60	.72
	3. SBE allows me to see my shortcomings.	322	3.95	.53
	4. SBE helps me to use theoretical information during practices.	322	3.83	.58
	5. SBE increases the quality of healthcare.	322	3.69	.63
	6. I would like to receive SBE.	322	3.79	.69
Self-efficacy	7. SBE increases my critical decision-making skills.	321	3.83	.60
	8. SBE has a positive effect on my clinical success.	321	3.86	.59
	9. SBE prepares me for the real clinical environment	321	3.57	.78
	10. SBE decreases the risk of my making mistakes during clinical practice	322	3.61	.68
	11. SBE helps me realize my shortcomings.	320	3.91	.47
Fidelity	12. It is important for me to learn various learning techniques during the SBE process.	322	3.85	.59
	13. It would be helpful to integrate the SBE methods to all applied courses.	322	3.76	.58
	14. SBE increases my wish to learn	322	3.79	.65
	15. SBE gives an almost real clinical experience	322	3.34	.90
Difficulty	16.1 *SBE is boring for me. (not reversed)	322	2.57	.82
	16.2 *SBE is boring for me. (reversed)	322	3.43	.82
	17.1 *SBE is a waste of time. (not reversed)	321	2.35	.82
	17.2 *SBE is a waste of time. (reversed)	321	3.66	.82
	18.1 *SBE increases the workload. (not reversed)	322	3.12	.92
	18.2 *SBE increases the workload. (reversed)	322	2.88	.92
Note: SBEAS: 1 = Completely Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree; 5 = Completely Agree (*Reversed scores in calculation of total score)				

Table 3: Post-intervention scores on SBEAS score

Data elicited from the ‘self-confidence’ scale indicated overall high levels of satisfaction with the programme (mean = 3.95-3.60; SD = 0.53-0.72). Students indicated that their self-confidence was enhanced because the programme helped them to use theoretical information during clinical practice (mean = 3.83; SD = 0.58), allowed them to participate in clinical practice activities (mean = 3.70; SD = 0.65) and increased the quality of healthcare that they provided in clinical practice (mean = 3.69; SD = 0.63).

The results for the ‘self-efficacy’ scale revealed that the three highest scores for satisfaction with the programme were for the following subscales: ‘The programme helps me realize my shortcomings’ (mean = 3.91; SD = 0.47); ‘The programme has a positive effect on my clinical success’ (mean = 3.86; SD = 0.59) and ‘The programme prepares me for the real clinical environment’ (mean = 3.57; SD = 0.78).

Relatively lower scores were obtained for the ‘fidelity’ scale. The highest scores were obtained for the subscales of ‘It is important for me to learn various learning techniques during the process’ and

‘The programme increases my wish to learn’, with mean scores of 3.85 (SD = 0.59) and 3.79 (SD = 0.65), respectively.

The sub-dimension of ‘difficulty’ contained three reversed items that were used to countercheck the non-reversed items. For the non-reversed items, lower scores indicated more positive attitudes and greater motivation and satisfaction towards the alternative method of AED clinical learning. The two lowest scores were obtained for the subscales of ‘The programme is a waste of time’ (mean = 2.35; SD = 0.82) and ‘The programme is boring for me’ (mean = 2.57; SD = 0.82).

6.1.3. Simulation scores

Students’ motivation towards the programme was measured using a 7-point SIMS scale (Table 4). The three highest scores were obtained for the sub-items of ‘Because I am supposed to do it’ (mean = 4.96 out of 7; SD = 1.12); ‘Because it is something that I have to do’ (mean = 4.94; SD = 1.14) and ‘Because I think that this activity is good for me’ (mean = 4.92; SD = 1.14).

Simulation Scores		Total (n)	Mean	(SD)
1.	Because I think that this activity is interesting.	319	4.41	1.20
2.	Because I am doing it for my own good.	318	4.79	1.12
3.	Because I am supposed to do it.	321	4.96	1.12
4.	There may be good reasons to do this activity, but personally I don’t see any.	322	3.21	1.36
5.	Because I think that this activity is pleasant.	320	4.42	1.12
6.	Because I think that this activity is good for me.	321	4.92	1.14
7.	Because it is something that I have to do.	320	4.94	1.14
8.	I do this activity, but I am not sure if it is worth it.	320	3.32	1.31
9.	Because this activity is fun.	320	4.25	1.21
10.	By personal decision.	321	4.14	1.15
11.	Because I don’t have any choice.	322	3.84	1.51
12.	I don’t know; I don’t see what this activity brings me.	319	2.90	1.34
13.	Because I feel good when doing this activity.	319	4.34	1.16
14.	Because I believe that this activity is important for me.	321	4.81	1.11
15.	Because I feel that I have to do it.	318	4.71	1.13
16.	I do this activity, but I am not sure it is a good thing to pursue it.	321	3.40	1.32
Note: Stimulation scores: 1 = Corresponds Not All; 2 = Corresponds A Very Little; 3 = Corresponds A Little; 4 = Corresponds Moderately; 5 = Corresponds Enough; 6 = Corresponds A Lot; 7 = Corresponds Exactly				

Table 4: Post-intervention scores on SIMS

6.1.4. Satisfaction scores

A 5-point satisfaction scale was used to assess the students’ level of satisfaction with the programme. The three sub-items that the students felt were the most satisfactory were ‘It is my responsibility as the student to learn what I need to know from this simulation activity’ (mean = 3.87 out of 5; SD = 0.49); ‘My instructors used helpful resources to teach the simulation’ (mean = 3.86; SD = 0.57); and ‘The way my instructors taught the simulation was suitable to the way I learn’ (mean = 3.85; SD = 0.58; Table 5).

Satisfaction Scores		Total (n)	Mean	(SD)
		322	48.20	5.78
1.	The teaching methods used in this simulation were helpful and effective.	321	3.72	.62
2.	The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.	319	3.76	.61
3.	I enjoyed how my instructor taught the simulation.	321	3.84	.62
4.	The teaching materials used in this simulation were motivating and helped me to learn.	320	3.74	.63
5.	The way my instructor(s) taught the simulation was suitable to the way I learn.	322	3.85	.58
6.	I am confident that I am mastering the content of the simulation activity that my instructors presented to me.	321	3.49	.65
7.	I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum.	321	3.66	.59
8.	I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting.	322	3.63	.62
9.	My instructors used helpful resources to teach the simulation.	319	3.86	.57
10.	It is my responsibility as the student to learn what I need to know from this simulation activity.	318	3.87	.49
11.	I know how to get help when I do not understand the concepts covered in the simulation.	319	3.78	.60
12.	I know how to use simulation activities to learn critical aspects of these skills.	322	3.76	.56
13.	It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time.	321	3.47	.78
Notes: Student Satisfaction: 1 = Strongly Disagree; 2 = Disagree; 3 = Undecided; 4 = Agree; 5 = Strongly Agree				

Table 5: Post-intervention scores on student satisfaction

7. Discussion

This was an innovative study that explored the level of perceived clinical competency of nursing students after participating in a programme that combined flipped classroom and simulated clinical learning. The programme was found to help nursing students learn various nursing techniques, apply theoretical information to practice and improve their critical decision-making during clinical practice. In addition, the students demonstrated motivation and satisfaction with the programme and showed significant improvements in their theoretical knowledge after attending the programme, as indicated by improved scores for the MCQs. The findings of this study were similar to those of other studies showing that simulation-based education programmes increase students' perceived clinical competencies, even they were not related to emergency care [7, 8].

This study used teaching strategies that included online evidence-based lectures, flipped classrooms and simulated-based education to enhance nursing students' psychomotor and cognitive skills, which are increasingly required due to fast-paced developments in science and technology [9]. Nursing leadership, teamwork, interpersonal communication, and evidence-based practice are necessary for the development of professional nursing competency [10]. Flipped classrooms and simulations were provided to students to facilitate their learning before they participate in real clinical practicum, as simulations mimic real clinical situations and allow students to practice and thus increase their knowledge level and self-confidence, and enhance their clinical sense and clinical thinking [11]. Students have been reported to be largely satisfied with what they have learnt during simulations, as they

believe that it helps them provide efficient nursing care to patients. In addition, after their nursing skills have been assessed during a simulation, they learn from their mistakes while enhances their competency level [7, 10].

The students enjoy alternative clinical teaching methods that enhance their level of knowledge prior to participating in clinical practice [10]. The findings of this study are consistent with those of previous studies showing that nursing students believe that simulation-based education allows them to identify their shortcomings and decreases their risk of making mistakes during clinical practice [10, 12]. Hence, the combination of flipped classrooms and simulation-based education has been shown to be effective for clinical learning, as it motivates students and develops their confidence over a short clinical learning period [12].

Although the ongoing COVID-19 pandemic has resulted in challenges for clinical nursing education, it has also provided nursing educators with opportunities to develop innovative clinical education pedagogies. The use of simulations was promoted worldwide to nursing curricula and counted as clinical hours during the pandemic. This study clearly showed that simulation provides an effective and satisfactory alternative learning experience for students to clinical placement. However, similar to Chan, et al. and Pam Moule, et al.'s studies, our programme showed that the combination of flipped classrooms and simulations requires a high level of resources, such as technology and equipment, consumables, simulation venues and facilities and educational manpower. Experienced, and competent educators are also required in order to support the programme [2, 13].

In addition, students may experience stress due to ineffective communication during the simulation¹⁴. There is a gap between the communication skills that students learn in the classroom and how they apply these skills in clinical practice¹⁵. Effective therapeutic communication skills, such as nursing assessments, intervention implementation and the hand-over of clinical cases, are important to maintain high-quality patient care [16]. Therefore, therapeutic communication skills should also be integrated as a component of the nursing curriculum for simulation-based education programmes [14, 17].

Using new technologies is a way to effectively engage and improve student learning. No participants in our study has an onsite experience in emergency department. To increase the sense of reality, future studies can adopt various alternative clinical training methods such as video-based, high-fidelity simulations, virtual reality, or augmented reality.

8. Limitations

This study has some limitations that should be noted. As this study used a one-group, pre-test post-test design, there was no control group with which to compare the results. Moreover, there was a lack of long-term measurements to evaluate the students' level of satisfaction with the programme and their clinical learning progress after completing the programme.

9. Conclusion

In this study, we examined the effectiveness of a hybrid use of flipped classroom and high-fidelity simulations on the emergency knowledge among nursing students who have not had the chance to go clinical placement. The results showed that the programme offered them an opportunity to apply their clinical nursing decision-making skills, prioritise nursing problems and implement nursing care using their acquired knowledge, to solve the programs that commonly found in the accident and emergency department. This programme was shown to enhance students' clinical competence before they began nursing practice in real clinical settings. Such a programme is especially important during the COVID-19 pandemic, which has disrupted the normal pattern of the undergraduate nursing curriculum. Further development of innovative clinical education pedagogies is crucial to sustain alternative clinical teaching methods beyond the COVID-19 pandemic.

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