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Exploration of Student Adaptation to Blended Learning in Clinical Stage Medical Education During the COVID-19 Pandemic

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ABSTRACT

Clinical learning in medical education experienced drastic changes due to the COVID-19 pandemic, including the transition from traditional to online and blended learning models. This condition has resulted in the reduction of student's clinical skills experience. The adaptation process has become challenging and crucial to determining the success of clinical education. The aim of this study is to explore student adaptation to blended learning in clinical stage during the COVID-19 pandemic. This study used a qualitative phenomenology design. Data were collected through focus group discussions (FGDs) with 33 students divided into four sessions. The collected data were transcribed and analysed using thematic analysis methods. Triangulation and member checking were conducted to ensure trustworthiness. We identified nine themes and subthemes in three categories. The first category concern changes in clinical learning, including changes in the education system, student's emotional reactions and obstacles. The second category focuses on medical students' perceptions about blended learning, including benefits and burdens. The last category concerns student adaptation to clinical education, including adaptation to the pandemic situation and blended learning, factors influencing student adaptation and expectations. Students adapted to blended learning by preventing COVID-19 infection, preparing gadgets and information technology (IT) skills, learning innovation and time adjustment. Blended learning was considered beneficial in terms of accessibility, effectivity, flexibility and self-improvement opportunities, while challenges such as teaching clinical skills, less clinical exposure, inappropriate schedules, technical problems, communication barriers, a non-conducive learning environment and complicated examination procedures need to be addressed. Internal and external factors influence student success in blended learning.

Keywords: *Adaptation, Blended learning, Clinical learning, Medical student, Pandemic*

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INTRODUCTION

Patient exposure is the main modality in clinical stage medical education (1). The clinical learning environment not only improves clinical skills but also teaches professionalism and communication skills. Many factors can influence clinical learning outcomes. Two important factors in clinical learning are patient exposure and clinical experience (2). The clinical learning method that was previously carried out in clinical environments, such as hospitals, underwent drastic changes during the COVID-19 pandemic. Coronavirus infection had a major impact not only on the health sector but also on the education sector. Infection control needed social restrictions, thus, resulted in limited face-to-face interaction between people (3). This situation required students and faculty members to adapt quickly without any available guidelines, especially to changes in learning methods and systems (4). The majority of students in the University of the West Indies in Barbados stated that they lost clinical skill experiences since the implementation of online learning during the COVID-19 pandemic, and only 33% of clinical stage students were able to adapt successfully in the transition to online learning (5). Student adaptations include the provision of gadgets, financial management, adapting learning styles, and managing mental and physical health (6).

As the COVID-19 pandemic subsided, clinical learning shifted from being fully online to a combination of online and offline, called blended learning (7). The blended learning model allows students to benefit from the technology used in learning while maintaining social interaction and direct exposure to the clinical environment (8). Several studies have shown that blended learning is more appropriate for clinical teaching than traditional and fully online methods (8, 9). One form of blended learning implementation is conducting expert lectures online and organising bedside teaching activities in person (9). Shehata et al. (10) concluded that online learning methods will continue to be used and improved even after the pandemic is over. Online learning systems should be integrated into the curriculum at an intensity of 20%–30% of the learning activities. While there is potential for blended learning to continue to be implemented in clinical medical education in the future, the success of current blended learning models' implementation in clinical education has yet to show consistent results (11, 12).

Students are the main stakeholders in determining the success of clinical education. Therefore, it is important to explore the process of student adaptation to blended learning. This study aims to explore the student adaptation process, student perceptions and factors that influenced student success in the transition to blended learning. This information is important for designing and improving the quality of blended learning in clinical stage education to produce qualified graduate doctors in the future.

During the COVID-19 pandemic, the Faculty of Medicine, Syarif Hidayatullah State Islamic University adapted clinical stage education at Fatmawati General Hospital. Learning activities were closed on 16 March 2020. After four weeks off, full online learning began on 20 April 2020 and was carried out for all minor and major rotations. Full online learning lasted for five months. Some rotations began to implement hybrid learning (simultaneous onsite learning for some students and online for others), while other rotations continued to implement full online learning. Thereafter, the blended learning model was introduced and applied to all phases on 23 November 2020 and has persisted until now. In the blended learning model, all students experience both online and onsite learning together. The

blended learning model is carried out by inserting some online portions in some of the educational activities, such as case presentations, material delivery, discussions and duty reports. For polyclinics, ward duties, and bed side teaching have been carried out onsite. For example, case presentations in the morning were conducted online, while in the afternoon, students attended offline learning to visit patients (ward duties). This data was obtained from the academic letter of Faculty of Medicine, Syarif Hidayatullah State Islamic University to Fatmawati General Hospital, 2020.

METHODS

This study used a qualitative phenomenology design to explore student adaptation to blended learning in clinical stage medical education during the COVID-19 pandemic. The respondents of this study were students of the Faculty of Medicine, Syarif Hidayatullah State Islamic University, Jakarta who started their clinical stage in 2020, thus, the respondents had experience in traditional learning and blended learning in their clinical stage. Respondents were selected using the principle of appropriateness based on their background and knowledge of the research topic. The expected variations in one focus group discussion (FGD) session are gender variations, variations in staging groups during clinical education and age variations.

Data were collected through FGDs with open-ended questions related to blended learning in clinical education during the COVID-19 pandemic and the adaptation process of students. Questions in the FGD were developed by researchers to unveil students' learning experiences in the process of adapting clinical stage learning during the pandemic to the blended learning used at the time, as well as its impact on students' clinical skills abilities. FGDs were conducted online until data saturation was reached.

Data were processed using thematic analysis with the step for coding and theorisation (SCAT) approach. Thematic analysis starts from data transcription and continues through making initial codes, determining themes from the codes and categories that have been obtained, reviewing, defining and naming themes. The themes were connected with other themes and related theoretical reviews. The results of the thematic analysis in this study were presented in the form of a narrative and quotations from the transcriptions of the FGDs. To strengthen trustworthiness, triangulation and member checking were carried out by all researchers and representatives of each FGD group.

RESULTS

Thirty-three students participated in the FGDs, divided into four sessions. There were 19 female and 14 male respondents. The respondents' ages ranged from 23 to 27 years old (Table 1). Based on the thematic analysis, there are three categories of themes, which consist of nine themes (Table 2).

Table 1: Respondent's characteristic

Gender	Age (year)					Total (%)
	23	24	25	26	27	
Male	0	6	5	1	2	14 (42)
Female	3	11	1	3	1	19 (53)
Total	3	17	6	4	3	33 (100)

Table 2: Themes and subthemes

Theme	Subtheme
Changes in clinical education during COVID-19 pandemic	
Changes in system and clinical learning activities during COVID-19 pandemic	Clinical learning activities
	Student-patient interaction
	Student's workload
	Assessment
Student's emotional reaction towards clinical learning during COVID-19 pandemic	Worried
	Surprised
	Confused
	Disappointed
Obstacles in clinical education during COVID-19 pandemic	Schedule
	Teacher
	Learning environment
	Technical
	Communication
Medical student perception about blended learning in clinical education during COVID-19 pandemic	
Benefits of blended learning	Knowledge and material accessibility
	Learning and coaching effectivity
	Time flexibility
	Opportunity for self-improvements
Limitation in blended learning	Clinical skill teaching
	Cases exposure
	Student resting time
	Examination procedure
	Student interaction with another stakeholder
Student adaptation towards blended learning during COVID-19 pandemic	
Student adaptation to COVID-19 pandemic situation	Maintaining health
	Use of PPE
	Limiting interaction

(Continued on next page)

Table 2: (Continued)

Theme	Subtheme
Student adaptation on blended learning	Preparing IT Learning innovation Time adjustment
Success factors in blended learning during COVID-19 pandemic	Internal factors <ol style="list-style-type: none"> 1. Self-motivation 2. Concentration ability 3. Time and learning management ability External factors <ol style="list-style-type: none"> 1. Student collaboration 2. Teacher expertise 3. Individual and institution facilities 4. Schedule 5. Institution and hospital collaboration
Student expectation	Learning activities planning Providing facilities and infrastructures

Note: PPE = personal protection equipment; IT = information technology.

Changes in Clinical Education During the COVID-19 Pandemic

Changes in system and learning activities

Students experienced 2–3 weeks off due to the social restrictions implemented to control infection.

The delay may be around 2–3 weeks. (M14,1)

The capacity was reduced. Previously, the hospital accepted 10 students to do their internship, but at that time, it was reduced to only five students. (M3,31)

Clinical rotation schedules were uncertain and often changed unexpectedly. Feedback delivery refers to how feedback is conveyed to students. The respondents mentioned various ways of delivering feedback: angry, condescending, gentle, apologising, and facilitating.

And the schedule was uncertain. We were informed about the next schedule one week before entering the rotation. (M13,14)

The learning method transitioned to half online and half onsite for all rotations. Students experienced six months of online sessions for all rotation, then followed by onsite sessions for all rotations. Therefore, each rotation consisted of 2–3 weeks of online sessions and 2–3 weeks of onsite sessions. The shorter period for onsite learning was caused by fewer bedside teaching opportunities for students.

It was divided into two sessions: onsite and online. But we didn't do it immediately. For example, two weeks after offline, we didn't attend onsite immediately. We held all the online rotations first, then later we continued the onsite session for 10 rotations. (M31,27)

The rotation was paused (from online sessions to onsite sessions in the same rotation) for around half a year or several months. (M3,71)

That means only about two or three weeks of onsite sessions. For the previous three weeks, we were online. So, the BST [bedside teaching] opportunity is very limited. (M7,22)

Patient exposure for students was also restricted, which resulted in less clinical experience for students. Most students only had the opportunity to observe from a distance and were not allowed to be in direct contact with patients.

We are not allowed to interact with patients who were confirmed or suspected to have COVID-19. We can only observe from a distance. (M4,80)

Student's workload was decreased in terms of physical activities, while it increased in terms of online lectures. Due to restricted interaction with patients, students experienced fewer ward duties and had fewer patients to examine. Because of the encountered limited case availability and decreased clinical exposure, students had to attend more classes with lecturers.

I only followed up with four or five patients per day. In the past, my seniors could have up to 20 patients. (M26,3)

We had class until the evening. I had a discussion every day with the consultant lecturer that I followed. (M11,46)

During the pandemic, not only were teaching and learning activities conducted online; assessment and examinations were held online as well. Objective Structured Clinical Examination (OSCE) were cancelled due to patient interaction restrictions.

There were also online exams. (M1,33)

OSCEs were cancelled. Examinations were in the forms of case discussions and written assessment. (M3,31)

Student's emotional reactions

The COVID-19 pandemic caused feelings of worry, shock, confusion and disappointment among students. The main concern of the students was the fear of being exposed to COVID-19, both for themselves and for others around them. In addition, students worried about new learning methods and prolonged study durations.

... afraid of getting COVID-19. (M12,38)

I was more confused about the learning method because it was online. Our teachers were also confused because it was the first time. (M28,8)

Personally, I felt sad because the pandemic made us take longer to graduate, meaning more tuition fees to pay. (M17,1)

Obstacles

Students complained about the time gap between the online and onsite rotations. Lectures were held at times that were not conducive, such as too late at night. Student schedules became tighter because they had to attend both onsite and online learning.

After we attended the online rotation, the offline rotation for the subject would be half a year or seven months later. (M4,12)

I finished from the hospital in the afternoon. Then, I had to immediately make another PowerPoint presentation for an online class at night. It was sometimes chaotic. (M11,67)

There were faculty members who lacked knowledge regarding the use of technology. In addition, the faculty members seemed to teach less optimally online.

There were also many senior staff members, and they couldn't keep up with technology. (M11,71)

The consultants seemed to be in a hurry. They didn't teach as much as they did in onsite learning. (M8,84)

Students' living conditions were not entirely conducive to the learning process.

...especially if you attended Zoom at home. Sometimes, my mom asked for help, so I missed some information in class, or sometimes I felt sleepy, so it was less efficient for me. (M1,74)

Technical problems that occurred included limited internet quota, unstable signals and incompatibility of the devices used.

Network signal was a problem for those who lived in remote areas. (M6,77)

Exams were conducted using a certain application. Some of us could not upgrade and run the application on our devices. (M15,66)

Unstable connection resulted in failure to deliver messages properly, causing misunderstandings between the giver and receiver of the message.

Miscommunication was one of the obstacles. For example, sometimes the teacher thought we didn't answer his question when we did answer, but bad connection made our voice unheard. (M15,65)

Medical Student Perceptions About Blended Learning During Pandemic

Benefits of blended learning

Students could record lectures delivered online and replay them when needed. The existence of online media also allowed students to gain knowledge from other sources, such as webinars conducted online.

There was one useful aspect of online lectures: we could record them. (M15,60)

We could get knowledge from outside the campus easier and documented comprehensively than before the pandemic. (M15,64)

Learning could be more effective when conducted online, as students no longer needed to wait until night at the hospital for a single lecture. Furthermore, online platform allowed coaching to become more intensive. The effectiveness of teaching theory makes students better prepared for written exams.

During my offline rotation, I was no longer surprised by the course material, so I only needed to review a little. This gave me more time to practice directly with the patients. (M30,16)

The mentoring system was more intensive. For example, several students could have been mentored by multiple teachers, or one teacher could have mentored a single student. (M3,46)

Online learning helps us to prepare for CBTs [computer-based tests], practice taking patient histories and diagnosing. (M16,54)

Teachers could deliver lectures from anywhere, which enabled more flexible scheduling.

It was more time-flexible. Thus, if the doctor was unavailable to teach at the hospital, we could be flexible and have the lecture at another time. (M14,52)

Students were able to develop new skills, such as technological abilities, and explore non-academic potential while continuing their education.

We were constantly encouraged to keep up with the technology era. (M4,13)

It allowed us to improve ourselves beyond our academic potential. For instance, we could participate in organisation events concurrently with our education. (M4,72)

Burden of blended learning

Despite the many benefits of blended learning, there were some drawbacks, particularly the ineffective teaching of clinical skills and fewer opportunities for bedside teaching, which left students less prepared for OSCEs and facing real patients.

For the skills, I don't think it can be replaced with online learning. You have to practice with actual patients. (M22,21)

There was the mental problem. We were less ready psychologically to face patients and their cases because we rarely met real patients, Doc. (M19,23)

The decreasing number of patient case variations made it difficult for students to achieve competence. Cases that should be mastered with competency levels 3 and 4 and emergencies were not fulfilled due to students not being in the emergency room full time. According to the general practitioner competency standard in Indonesia, level 4 competency cases are considered the highest level for general practitioners. Graduates should be able to treat these cases independently and comprehensively.

There were fewer cases of level 4 competency that appeared when we were co-assistants. (M2,63)

Even though we could interact with patients, most of the patients were already in a stable condition. Thus, we couldn't find and see the typical acute and emergency conditions of patients. (M27,6)

Blended learning, which was sometimes carried out during breaks, gave students less time to rest.

Time was getting tighter. We had to be awake more often. (M1,48)

Student exams conducted online have more complicated rules than offline exams, especially to anticipate cheating.

It was really complicated, especially with the rules requiring us to have a full-body mirror and two devices; it seems very ineffective. (M11,69)

The shorter offline rotation reduced the opportunity for students to interact directly with each other, with colleagues in the hospital and with faculty members. This means that students lacked opportunities to practice their communication skills.

Actually, when it was online, there were fewer interactions with doctors and other colleagues. (M15,26)

Student Adaptation in Clinical Education During the Pandemic

Student adaptation towards the pandemic situation

During the pandemic, students tried to take better care of their health and use personal protection equipment (PPE) to prevent being infected with COVID-19.

We had to take care of our health. (M2,38)

I learned more about the correct use of PPE. (M5,16)

I reduced my interaction with people, also with patients. (M12,39)

Student adaptation towards blended learning

Students adapted by learning to use technology and information media that may not have been used before by preparing facilities and infrastructure to support online learning.

Improved technology literacy. It means being trendy. We had to update this and that. We had to be able to use this tool, that tool. (M12,63)

Then we had to prepare the device, quota, wi-fi, and find more stable connection. (M2,43)

Due to the limited number of patients and the variety of cases during the pandemic, students adapted by being more creative in finding learning resources and being more active in finding opportunities to practice.

For the case that I didn't get, I tried to find it in the literature in either textbooks or journals. (M8,30)

If a nurse asked for help in carrying out a procedure on a patient, we would definitely help them so that we could learn the skills from there. We waited at the nurse station to find opportunities. (M23,29)

Some of us took (external) online courses. (M1,37)

We learned from the family. When there were families who were sick, we helped with consultations and then examined them. (M4,96)

Online rotations that were far away from the offline rotations for each subject made students easily forget about the material taught. Thus, students had to repeat the material to understand it better. Students also shared case availability in the hospital with other students.

Indeed, at that time, we needed to recall the material that had been taught in online class. (M19,9)

Each student would share the patients they met and bring each other closer to the case. They called other friends to come, to show a patient with rhonchus, the characteristics, etc. (M2,68)

The blended learning made students learn how to manage self-regulated learning and how to be creative in finding learning media.

The system was like independent learning. We measured our achievements based on competency standards, evaluated what we still lacked and found a way to achieve the knowledge. (M27,20)

We made a video, then the teacher would evaluate our performance in the video. (M12,37)

We practiced suturing using raw chicken, then other exercise using that [alternative tools]. (M22,20)

Students adjusted to time management for assignments, shift duties, online lectures and so on. This caused students to sacrifice their rest time.

For adaptation, maybe time management, because the time was more tightened up [between online and onsite schedule]. (M1,48)

Because online learning can be held whenever the teacher wants, it could be at ten o'clock at night, even after night prayer you still had to attend online class. So, I had to adjust my timing. (M2,42)

Factors influencing student adaptation

Students identified internal success factors such as self-motivation, the ability to concentrate and the ability to manage time and study.

From the learner himself, it is his motivation to learn and explore more clinical knowledge and skills. (M27,69)

The second thing is to manage the time between online and offline learning. (M2,87)

The external factors identified by students were teamwork between students, expertise and readiness of faculty members, technical readiness including infrastructure, class schedule arrangements and coordination between hospitals and institutions.

The important part was communication...between students, students with their teachers and with students in other rotations. (M13,75)

...also from the internet connection. (M8,85)

The external factors may be from the gadget. There are those whose gadgets are not compatible. (M21,59)

Success definitely requires cooperation and interconnection among students, teachers and institutions. (M31,74)

Student expectations

First, it was necessary to decide which rotations worked better with blended learning and which rotations worked better with a fully onsite system. For example, students stated that in some rotations like internal medicine, it was better to start with online sessions before continuing with onsite sessions. Thus, for blended learning, we should identify what kinds of learning activities could be conducted online.

There were some rotations for which it was more effective to have online sessions for theoretical lectures followed by practice in onsite sessions. For example, internal medicine. (M31,24)

Some activities that only required us to discuss the theories, such as lectures, could be done online. Case discussions and shift reports could also be done online. (M6,53)

Students hoped that blended learning would still be used for clinical stage education, with the proportion of the online component being much less than that of the onsite component in 20–80 or 10–90 ratios. Meanwhile, the actual proportion that the students experienced was 50–50.

However, the proportion should not be 50–50; it could be up to 20–80. (M7,98)

Ninety percent of the activities should be offline rather than on Zoom. (M13,83)

Students hoped that lectures conducted online would be scheduled at hours that were still conducive to learning, for example, before sunset.

For example, online meetings should be carried out before sunset at the latest. (M18,35)

Students hoped that examinations would be carried out onsite. If held online, the technical procedures should be made easier.

Maybe the system should not require us to do so because, honestly, not all of us have space for two devices or a full-body mirror. (M12,70)

Students expected the availability of a clear guidebook in all rotations containing checklists of competency targets that students must achieve.

If possible, a guidebook that identifies student learning objectives and competencies we should achieve should be provided. (M30,83)

Students hoped that the faculty could provide additional facilities for students, such as internet packages and Zoom rooms.

For example, providing support for departments in the hospitals, such as wi-fi networks, specific rooms for conducting online teaching and so on. (M6,102)

DISCUSSION

This study aims to explore students' adaptation to blended learning in clinical learning during the COVID-19 pandemic. Clinical education is an important phase that students go through and is a transition from the learner phase to becoming a doctor. Clinical education is not easy, and the COVID-19 pandemic added more challenges that drastically altered the teaching of medical education not only during the pandemic but after it as well. This study identified nine themes that describe the clinical learning situation, the changes faced by students (blended learning), the process of student adaptation to these changes and the factors that affect the success of blended learning.

In this study, changes in clinical education during the pandemic were learning method adjustment, less patient interaction, low clinical exposure, changes in students' workloads and changes in assessment method. In the early stages of the COVID-19 pandemic, clinical education was paused for 2–3 weeks due to social distancing instructions and infection control. Thereafter, clinical education was continued through online methods. Each rotation/module was divided into two sessions: 2–3 weeks of online sessions and 2–3 weeks of onsite sessions. This was dependent on whether the rotation was minor or major. The online sessions in all rotations were held first, accumulated in approximately six months. After that, students started onsite sessions for each rotation, with a 50–50 online–onsite split.

During onsite sessions, students used blended learning methods, which still used online for some learning activities. The following activities were held online: lectures, group discussions, clinical skill video demonstrations, introduction lectures to prepare for onsite sessions, case reports, intensive online coaching and computer-based tests. Students' onsite activities included bedside teaching, ward duty, clinical skill/hands-on learning, and patient visits. During clinical education in the pandemic, students identified obstacles such as uncertain schedules, long gaps between online and onsite sessions, unsupportive teachers, inconvenient learning environments, technical issues and communication barriers. Meanwhile, students agreed that blended learning has some benefits for clinical education, such as easier access to knowledge and lecture material, time and cost efficiency for learning and coaching, time flexibility and more opportunities for self-improvement. However, blended learning for clinical education has the following limitations: ineffectiveness in teaching clinical skills, reduced case exposure, decreased student resting time due to simultaneous onsite and online learning activities, unsuitability for examination and decreased student interaction with other stakeholders. Amid this transition, students adapted by maintaining their health, preparing PPE, limiting human interaction, learning to operate technology, learning innovation and managing their time.

However, internal factors, such as self-motivation, ability to focus, time management and learning ability and external factors, such as student collaboration, teacher expertise, facilities and collaboration between hospital and institution, could influence students' success in blended learning. Students recommended a proportion adjustment between online and onsite learning to improve blended learning in clinical education. Online learning should be only 10%–20% of all activities. Online learning should only be used for scientific activities, such as lectures, case presentations and coaching. Clinical skill teaching, case exposure, patient interaction, bedside teaching and assessment should be held onsite. Online methods should not decrease the proportion and quality of all clinical experiences.

The American Association of Medical Colleges (13) also instructed medical faculties to cancel clinical training activities for a minimum of two weeks to ensure the safety of patients and students and to reduce the need for PPE (14, 15). However, Miller et al. (16) suggested that

the presence of students could be beneficial. Students could gain experience and knowledge as they became additional support in patient care (16), similar to what happened during the Spanish Flu outbreak in 1981 (17) and the polio epidemic in Denmark (18). The interaction between students and patients during a pandemic is still controversial. There are several things to consider before involving students, including the safety of students and the urgency of involving students in health services (19).

Students indicated that the form of learning in clinical education changed to fully online and blended. This is in accordance with Daniel et al. (20), who stated that many studies highlight the use of technology and its applications in clinical learning.

This study showed that both online and offline time had almost equal portions. Similar schedule arrangements showed that the blended learning group had significantly higher written exam scores than the conventional group of students. However, the final score rotation of the blended group was significantly lower than that of the conventional student group (21). In another study, students experienced waiting periods of 5–8 months, which resulted in a failure to achieve practical competencies, so the duration of education had to be extended (22).

To meet the challenges of clinical learning during the pandemic, it is important for teachers to recognise the need for individual coaching (23). Ardekani et al. (24) reported that there are two types of individual student coaching: academic coaching and mental health coaching. However, mental health coaching was not identified in this study.

Online learning cannot be used as a substitute for teaching clinical skills. Based on this study, procedural and clinical skill teaching should be taught in offline sessions, while concepts and theories regarding these skills can be taught online (25–27). The lack of case exposure for students is the main deficit perceived by students, which ultimately reduced students' confidence in dealing with patient cases (28).

According to Rasheed et al. (29), time management, which encompasses procrastination, help-seeking ability, self-regulation ability, preparation before lectures and arranging learning strategies, can influence the success of blended learning. Good cooperation between students, peer learning motivation and supportive environments affect the success of blended learning. These factors relate to social influences that can affect students' efficacy in learning (30). The success factors of blended learning that emerged in this study are aligned when compared to the success factors of clinical teaching, which are content, strategy, environment, and teaching staff (31).

With the end of the pandemic situation, students expect online sessions to occupy a small portion (10%–20%) of overall clinical learning. A proportion of 30% for online sessions was found to be ideal for medical education (32). Online learning can still be used with an intensity of 20% to 30% of the curriculum (9). There are several suggestions that can be used to combine online and offline learning. First, online learning can be used to prepare for offline learning. Second, online learning can serve as a follow-up after an offline session. Third, online learning can provide supporting elements to offline learning (33).

The implications for educational institutions include the reassessment of the best methods and approaches for each rotation and for different types of education activities. Rotations with more procedural skills are best delivered entirely onsite. If blended learning is used, the online component should only supplement or support the core activities. Clinical skills should not be taught online. The online component should not reduce students' activities

with patients in the hospital. The online component can be reduced to 10% of the total learning activities. To anticipate obstacles and shortcomings, it is necessary for institutions to provide internet quotas, applications, trained staff and convenient scheduling of online sessions. Student mentoring can be made intensive and individualised to provide academic mental health coaching. Assessment must be routinely carried out between rotations to ensure the readiness and effectiveness of blended learning.

This study shows how the transition in the education system during the COVID-19 pandemic changed the education system. The findings will generate innovation on how future clinical education should be held. The findings affect how students and faculty see technology as a learning element, deal with students' emotions, arrange curricula for clinical education and face the limitations and challenges of blended learning in clinical education. Most importantly, the education system must remain adaptable to other crises that may happen in the future. This study can be used as a guide and consideration for designing a more sustainable and adaptable education system.

One limitation of this study is that it involved only one institution. Additionally, the study was conducted only on student groups without involving faculty members. This study has not considered other factors that might affect the adaptation process, such as personality, ethnicity, culture, and student background. Despite the limitations, this study has the advantage that the respondents have complete experience both in pre-pandemic and post-pandemic learning, ensuring that the researchers obtain appropriate data for exploring the student adaptation process.

CONCLUSION

Students adapted to blended learning by preventing COVID-19 infection, preparing gadgets, developed IT skills, learning innovation and time adjustment. However, students met obstacles when blended learning was implemented during pandemic in terms of schedule, patient exposure, not well-prepared faculty members, technical problems, inconducive learning environments and communication problems. Institutions were responsible for minimising possible obstacles that hindered students' ability to study in the blended learning model. Additionally, blended learning was considered beneficial in terms of accessibility, effectivity, flexibility and self-improvement opportunities, while challenges such as teaching clinical skills, less clinical exposure, less rest time, less interaction and complicated examination procedures need to be addressed. Both internal and external factors influence students' success in blended learning. Internal factors are related to motivation, time and learning management skills and concentration ability. External factors include collaboration between students, collaboration between teachers and institutions, scheduling, teacher expertise and facilities and infrastructure provided for blended learning.

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ETHICAL APPROVAL

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