


Clinical examinations for medical students during the COVID-19 outbreak: a simulated patient programme perspective

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ABSTRACT

Background The COVID-19 pandemic had a profound impact on how our university had to administer the high stakes, final year medical undergraduate clinical examinations without real patients, while maintaining its validity and rigour.

Method 11 out of the 21 stations of the medical, surgical and orthopaedic clinical examinations needed to be converted to simulated patient (SP)-based or task-based stations. Cases were developed based on an assessment blueprint, with consideration for SP demographics and availability of equipment. Infection control measures were strictly enforced to avoid transmission of COVID-19. Planning had to include consideration for physical distancing, cohorting and segregation of students and examiners. Student and SP anxiety had to be addressed.

Results The examination was executed successfully for 300 medical students. Everyone worked professionally and dealt with the changes and precautions that were required with flexibility.

Discussion An infectious disease outbreak can derail plans for major clinical examinations. Factors that facilitated a rapid and effective response included decisive leadership, open communication, willingness to collaborate, mobilising resources, adaptability and flexibility. Our school managed uncertainty by erring on the side of caution. This experience may serve as a reference for others in similar situations, particularly when COVID-19 restrictions start to be lifted.

INTRODUCTION

Medical education programmes around the world have been grappling with challenges arising from the Coronavirus Disease-19 (COVID-19) pandemic.^{1 2} Our institution was caught in the initial wave of protocol changes and precaution implementation that started in late January 2020.³ Our final year medical undergraduate examinations were scheduled to take place in March 2020. The heightened restrictions on patient contact with students and examiners made it impossible to run these examinations in their original format. We had to make a rapid decision on how to run the examinations safely, while meeting the assessment criteria for this high stakes barrier examination.

PROBLEM

The existing examination format consisted of a clinical objective structured clinical examination (OSCE), short case and long case examinations; amounting to a total of 21 stations. While the

OSCE stations traditionally involved simulated patients (SPs) trained to a high degree of standardisation, some other stations required students to examine real patients. Singapore went to 'Disease Outbreak Response System Condition' (DORSCON) orange on 7 February 2020.⁴ This meant that disease transmission posed a significant public health threat. When this alert was announced, the medical school made a rapid but deeply considered decision to change the examination format, replacing 11 of our real patient stations with SP-based stations and task trainers. We had approximately 4 weeks to prepare, while maintaining the integrity and validity of the assessment.

STEPS TAKEN FOR DEVELOPMENT AND IMPLEMENTATION

On receiving news of an infectious outbreak, and having experienced a high degree of patient no-show at clinics during the SARS outbreak, the medical school made the decision not to involve real patients in undergraduate examinations. This was proposed to the Ministry of Health and approved. A new blueprint of the examination content, with SP cases replacing real patient stations, was made by a small group of stakeholders to minimise the amount of time required to reach a consensus. Key personnel for us at this time were the chair of the faculty assessment committee (FAC), the undergraduate education directors for medicine, orthopaedics and surgery, as well as heads of departments.

Close partnership and open lines of communication among the FAC, the case writers and the SP programme director ensured the best outcome for examination plans and case design. The planning of an SP-based examination took into consideration the demographics of the SPs in our database. We had more elderly than young SPs. We went through the SP requirements for each examination day rigorously to make sure that there was no over-representation of a particular demographic to ensure the highest likelihood of success in securing the number of SPs needed. We have a database of 180 SPs, who are casual employees at our institution, containing their contacts and demographic details. We used this resource to rapidly mobilise SPs via email to avail themselves on the examination dates. Once the examination cases were designed and confirmed, we went on to secure the appropriate SPs. All SP participation in this examination, as with all other SP assignments in our institution, was



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voluntary. SPs also give informed consent when they sign up for our programme.

In designing the cases, we considered part-task trainers in hybrid simulation with an SP, physical examination simulators for example, Harvey the cardiopulmonary patient simulator, pre-recorded auscultation findings as well as moulage. Assessment of physical examination skills and the ability to pick up abnormal signs were of concern to the FAC. Cases where abnormal signs could be realistically simulated were considered. This was the first time that we were using simulated abnormal physical signs in the evaluation of students. Successful portrayals were achieved through demonstration of the abnormal signs by the SP trainer, showing of videos and diagrams as well as practice with immediate feedback with the SP trainer and clinical faculty. Standardisation across SPs was ensured by training the SPs in a group so that they could mimic or mirror each other where necessary. Examples of cases designed are listed in [table 1](#).

Availability of equipment and the large number of students to be examined were considerations in case design. Equipment was sourced from our simulation centre as well as university-affiliated hospitals. We realised the importance of a close working relationship with partner institutions. Careful planning of logistics, including number of circuits and duration of the examination, was based on available equipment.

To facilitate rapid case development, case writers utilised a secure online portal for discussion of the cases and for input by stakeholders. A small team of experienced case writers was enlisted. The review and approving committee also worked efficiently and effectively. This allowed for rapid case writing and approval without compromising the standards and security of the examinations.

Students were informed about the change in examination as soon as practically possible. Provisions were made for revision sessions to practice for the new format that involved more SPs and task trainers. Care was taken when planning student practice sessions with task trainers at the simulation centre to avoid cueing to the content of the stations. The chair of the FAC briefed the students regularly and addressed all their concerns.

Strict measures were implemented to prevent the spread of COVID-19. We ensured mandatory two times per day temperature monitoring and self-declaration of travel history or illness by

all parties involved. Strict hand hygiene, segregation of student and examiners from different hospitals, cohorting students into groups that stayed together throughout the examination, wearing of masks and frequent cleaning were enforced. Because our SPs are lay people, we needed to reassure them of their safety if they worked at the examination. They were informed of our infection control measures and given strict instructions to declare their own travel history and to be socially responsible in not coming to work when unwell. As the examination spanned over 1 month, increasing travel restrictions imposed by the Singapore government resulted in the need to withdraw some SPs at short notice. SP educators worked tirelessly to meet the needs of the examination, and SPs obliged by accepting last minute requests to fill in for *colleagues*.

Due to restrictions on the number of people allowed on site, we could not provide chaperones as freely as we could with examinations in 'peace time', where chaperones are usually provided for a female patient with a male student at physical examination stations. We were open with the SPs about this limitation and they signed an agreement prior to the examination, stating that they had been informed about the absence of a chaperone. SPs were empowered to halt the examination if they felt uncomfortable. Examiners were also briefed on this aspect. If any SP was uncomfortable with signing this agreement, they were allowed to withdraw from the assignment without repercussion.

OUTCOME

The COVID-19 situation came very abruptly resulting in an acute increase in demand for SPs to facilitate the execution of this final year clinical examination. Changes in precautions and policies occurred every few days. The examination plans had to be modified repeatedly even as the examination dates were approaching. SP skills in portraying patients with abnormal signs were tested. Resilience and flexibility in the entire SP team helped us deal with this. At the time of writing, we had successfully put 300 medical students through modified medical and surgical clinical examinations for which scores determined eligibility for graduation. The student failure rate was similar to the equivalent examination run in previous years.

We updated SPs frequently about changes in logistics and safety measures taken, while being truthful about the uncertainty and the theoretical risk that they would be facing. None of our SPs declined the assignment because of the COVID-19 situation. There was no documented transmission of COVID-19 among individuals involved in this examination.

LESSONS LEARNT

Through this experience, we learnt that certain factors facilitated a rapid and effective response. These included decisive leadership, open communication, willingness to collaborate, mobilising resource, adaptability and flexibility in all parties involved. Safety of faculty, staff, students and SPs was of prime consideration. Fear and anxiety were present particularly in the students and SPs and these needed to be addressed in the face of the rapid evolution of the COVID-19 pandemic.

Not all 180 of our SPs worked frequently with us. However, as our programme stipulates that they have to work at least once a year to remain in our database, we were assured that they would all be familiar with SP methodology. Having such 'less active' SPs in the database was useful in this time of crisis.

Areas for improvement would be considering compensation for SPs if they contracted COVID-19 in the course of working at the examination and more administrative support to avoid staff fatigue.

Table 1 Examples of modification of examination stations

SP preparation	
Surgical short case	
Acute cholecystitis	SP trained to mimic Murphy's sign
Breast lump	SP wore a breast task-trainer with a breast lump
Orthopaedic short case	
Neuropathic ulcer	SP had an ulcer moulage and simulated glove and stocking sensory loss
Ill-fitting back slab	SP had an ill-fitting backslab and simulated related pressure symptoms
Carpal tunnel syndrome	SP trained to simulate sensory loss
Medical short case	
Bilateral Pneumonia	SP simulated tachypnoea and wore nasal prongs. Lung auscultation findings (bilateral coarse crepitations) were played for student on a laptop
Mitral regurgitation	No SP, used Harvey
Parkinsonism	SP trained to have features of parkinsonism

SP, simulated patient.

The COVID-19 outbreak resulted in many consequences for medical education. In the face of uncertainty, we managed our undergraduate clinical examinations by erring on the side of caution. We described the factors that we felt were important in helping us successfully administer this examination. This could serve as a reference for other programmes that are facing similar issues in these uncertain times or in the future when schools start to lift COVID-19-related restrictions, particularly in regions of the world that involve real patients in their clinical examinations.

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