Introduction

The COVID-19 pandemic has caused widespread disruption to undergraduate medical education, particularly to clinical placements. At the time of writing this paper, UK hospitals are threatened with another wave of COVID admissions, placing greater strain on the National Health Service (NHS) than the first wave in March 2020 and the second in Winter of 2020. The continuation of previously halted clinical placements, as encouraged by the Medical School Council and governing bodies in order to fulfil the General Medical Council Outcomes for, is a further pressure that teaching hospitals must adapt to.

Broomfield Hospital, a large associated teaching hospital in Essex, employs fourteen Clinical Teaching Fellows (CTFs) across different specialties who have committed teaching time. Over 150 students from different year groups from both Queen Mary’s and Anglia Ruskin University, are placed at Broomfield Hospital during the academic year. This perspective will outline the innovations in implementing a blended learning approach in order to meet challenges and continue to provide medical students with safe and high-quality teaching.

What We Did

The undergraduate teaching team anticipated the need to adapt teaching methods to ensure medical students received essential clinical teaching in the forthcoming year. Clinical placements provide a valuable environment for students to contextualise book knowledge, gain confidence in clinical decision making and acquire a better understanding of health systems. Lost placement time has affected students’ confidence and preparation for life as a junior doctor. Our innovative design of placements focused on three main domains (Table 1) in keeping with the issues highlighted by the British Medical Association (BMA) to be addressed for medical school placements during the pandemic: supervision, risk assessment, access to PPE and mentoring.

Firstly, we had to ensure clinical placements were designed in a socially distant manner we hope to have alleviated some of these aforementioned fears.

Secondly, we placed an emphasis on increased pastoral support to help alleviate any anxieties associated with the current situation, as studies have shown a negative impact on mental health as a result of the pandemic.

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How We Did It

In anticipation of increased teaching pressures, Broomfield Hospital tripled their CTF recruitment, protecting teaching time from any pandemic induced rota changes. The increase in workforce enabled the education team to set up a blend
of technology-based teaching programmes alongside vital in-person teaching with student-patient interactions.9

Making placements safe for students and patients was our first priority. Students were separated into green and red placements to reduce cross-contamination between groups, in line with the hospital’s traffic light system for COVID-19 risk. Students were categorised in groups at induction and discussions regarding personal risk stratification were had prior to placements starting. After which, two parallel curriculums ran, one for green students and the other for red. Further safety measures included mask ‘FIT’ testing and instruction sessions on appropriate use of PPE. Students have had priority access to free vaccinations as frontline staff, thus avoiding anxieties reported by students elsewhere who have been denied access to vaccinations.10 At the time of publication, vaccinations were not mandatory but encouraged. Face-to-face teaching sessions were duplicated for red and green students further reducing risk of cross-infection.

Various innovative teaching techniques were introduced to enhance learning, due to increased difficulty for ward-based learning opportunities. Medical students have long supported the use of Apps and technology in their Education.11 The “OSLR” app was used to sign up to teaching sessions offered, request teaching sessions and provide feedback to educators. The “Pando” app provided a secure communication channel where students and CTFs could share details of interesting cases. All students had access to StarLeaf, a video-conferencing platform which we used to deliver CBDs, seminars and quizzes. To address the reduction in student-patient interaction, students were provided stewardship via a high amount of CTF led ward-based teaching within their red/green division.

Our biggest innovation to enhance learning was creation of a novel simulation ‘package’ for the final year medical students. There is an ever-increasing evidence-base for the benefits of simulation in healthcare education.12 and it has the added benefit during the COVID pandemic of creating high fidelity scenarios while minimising patient contact. This package consisted of multiple ‘bleep simulations’, virtual reality (VR) simulations and a ‘ward simulation’ in each 9-week rotation. VR simulations, using the Oxford Medical Simulator, aided in building confidence in a supported educational environment. Similarly, the ward and bleep simulations (example below, Figure 1), created at Broomfield, enabled students to experience common clinical scenarios and develop prioritisation skills.

To provide increased pastoral support for the medical students we introduced a CTF one to one mentoring scheme. Small Whatsapp groups between mentors and mentees were created to ensure continued communication and pastoral care. Further groups between CTFs and each year group allowed increased communication and support for students. To ensure student concerns were addressed, increased online communication between Medical Schools and the hospital ensured all members of the teaching team were informed about the students’ progress, any curriculum changes and student welfare.

### What We Have Learned

The CTFs were surveyed through recorded focused interviews and anonymous questionnaires. Thematic analyses were conducted and Likert scales created. This data provided an insight into what we have learnt about the delivery of teaching during the pandemic. Similarly, we extended the interviews and questions to students and we expect to publish this data in the near future.

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**Table 1. Innovation and adaptation of Broomfield hospital student clinical placements during COVID 19. There is overlap between the three domains for some elements of the placements.**

| Safety                                      | Learning Enhancements                              | Pastoral Support                           |
|---------------------------------------------|---------------------------------------------------|--------------------------------------------|
| Green and red separation in clinical areas  | Simulation Package – VR/Bleep/Ward                 | Mentorship Scheme                          |
| PPE, vaccinations & FIT testing            | OSLR and Pando apps                               | WhatsApp groups between all year groups and staff for regular updates and feedback |
| Paperless systems                          | High amount of CTF led ward-based teaching to steward student-patient interactions | Increased communication between the hospital and medical schools – raising any student or curriculum concerns. |
| Social distancing on wards and for in-person sessions | Number of CTFs at the Trust tripled in 2020 | The opportunity to deliver detailed feedback in focus groups at the end of rotations leading to benefits for future groups |
| Duplicated clinical skills sessions for red and green groups | Online CBDs/lectures, seminars and quizzes via StarLeaf |                                            |
| Small group teaching only in person        | Socially distanced mock OSCEs                     |                                            |
| Increased amount of online teaching        |                                                   |                                            |

VR: virtual reality. PPE: Personal Protective Equipment. CBD: Case based discussion OSCEs: Objective Structured Clinical Examination.
Dividing students into green and red groups enabled rules regarding isolation of contacts to be easily followed without disrupting the cohort’s teaching, while keeping students and patients safe. However, due to the dynamic nature of the pandemic, the red/green status was perhaps too rigid resulting in lost opportunities. We have learnt during the pandemic that there is a balance between safety and the necessity to gain clinical experience. As a result, while the placements for first years were suspended during the peak of the second wave, the teaching for students in later years continued as planned.

We have observed the increasing role of technology over the academic year. Both the aforementioned apps received positive feedback from students and fellows, with the ability to organise sessions, request teaching and deliver feedback in a safe and paperless format. The apps required refinement throughout the year and continued dialogue between the teaching team and app creators facilitated improvement. With social distancing in mind, CBDs were initially delivered with half the cohort in-person and half online. This trial led to reduced engagement in those attending online. Therefore, CBDs were moved online for all students which encouraged higher levels of student participation compared to the hybrid approach.

Students found the “simulation package” to be of particular value in building confidence and developing clinical judgement. Bleep simulations have been shown to be beneficial for students by a number of studies; combining this with new technology and ideas such as VR simulation and ward simulation provided unique learning opportunities which were heavily appreciated by students. We hope to expand our simulation program based on the positive feedback we’ve received.

The increased pastoral support was valued by students. The mentoring scheme provided students with an anchor with whom they could liaise on pastoral issues and gain personalised clinical experience. This was helpful for students who missed certain teaching during the first wave of the pandemic and was facilitated by a high teacher-student ratio. On average, three students to one CTF was optimal.

### Take Home Points

Educators must find the appropriate balance between maximising safety and optimising clinical exposure over the course of the pandemic. We achieved this through access to PPE and vaccinations as well as the dividing of students into red and green groups. Online learning provides the added flexibility of allowing educators and students to attend sessions during periods of illness or self-isolation.

Innovation and adaptation of teaching methods is essential to provide ongoing learning opportunities. We found that
this was possible through the use of technology, simulation and dedicated CTFs. Technology enhanced teaching through the use of such apps can become a staple of future clinical education.

Schemes and communication channels which promote consistent pastoral care are critical. We predict that the use of virtual meetings to benefit levels of communication between regional hospitals and associated medical schools will continue after the pandemic’s conclusion.

The coronavirus pandemic has brought about many positive changes to medical education strategies. It has also highlighted the value of previously used educational methods currently restricted. The products of innovation as a result of the pandemic must be used to supplement more traditional teaching methods.

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Ethical Approval
Not applicable, because this article does not contain any studies with human or animal subjects.

Informed Consent
Not applicable, because this article does not contain any studies with human or animal subjects.

Trial Registration
Not applicable, because this article does not contain any clinical trials.

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