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Title page

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Abstract

As the COVID-19 pandemic progressed in early 2020, social distancing rules and 'lockdowns' brought face to face teaching in universities in the UK, and globally, to a halt, leading to an abrupt move to online teaching and learning.

This article details student feedback to a course on applied forensic medicine and pathology – framed as 'safeguarding vulnerable patients' – which was adapted for delivery online in response to restrictions imposed by the pandemic.

That feedback indicated that the adapted online course was well-received and, overall, it compared favourably with pervious iterations of the blended learning course, which had included a substantial face to face teaching component. Students remained engaged with the teaching, and they continued to see the relevance of forensic medicine to their future clinical practice.

Keywords:

Forensic medicine

Forensic pathology

Medical education

Online learning

Safeguarding

Vulnerable populations

Introduction

Since 2015 all 3rd year undergraduate medical students at XXXX University's School of Medicine (SoM) have been taught clinical forensic medicine and forensic pathology through the lens of safeguarding the vulnerable patient at risk of abuse or neglect.

The development of this week-long 'protection of the vulnerable' course has previously been described in detail[1], including the educational philosophy, 'guiding principles' and Intended Learning Outcomes (ILOs) that informed it. Student feedback was sought after the first iteration, culminating in a focus group-based action research project the results of which led to a significant re-design of the course.

Feedback continued to be sought each year, via an anonymous online survey (https://www.onlinesurveys.ac.uk/), and incremental changes were made to the structure and content of the course to reflect the 'student voice'. Such feedback was being carefully considered following the December 2019 course when global events intervened.

In response to the COVID-19 pandemic, social distancing rules and 'lockdowns' forced universities to cease face-to-face teaching and educators were challenged by an abrupt move to almost universal online teaching.

This article builds on that which described the initial development of the 'protection of the vulnerable' course, charting the development, and reception, of an entirely online 'pandemic edition' delivered in December 2020.

The impact of the COVID-19 pandemic on preparations for the 2020 'protection of the vulnerable' course

When student feedback to the December 2019 course was being evaluated, the first COVID-19 related death locally had been announced[2], decisions were being taken in the university to phase out face to face teaching[3,4], and the UK entered a national 'lockdown'. Whether 'social distancing' rules would persist to December 2020 was uncertain[5] but a decision was made to adapt the existing course such that it could be delivered online if necessary.

The rapid adaptation to online teaching was a challenge that faced educators globally during the pandemic, a move which has been described in the literature by many others[6-10]. That such a change in the approach to medical education could be transformative beyond the pandemic, however, has also been recognised[11].

Guided by past student feedback, and the ILOs constructed for the course[1], technological solutions were explored for facilitating student engagement with course learning materials: videoconferencing platforms for synchronous and asynchronous discussions (mainly Microsoft (MS) Teams https://www.microsoft.com/en-gb/microsoft-teams/group-chat-software and Zoom https://zoom.us/); screen-casting platforms and MS PowerPoint for creating videos of didactic presentations; e-learning software (Xerte https://xerte.org.uk/index.php/en/); online digital curation platforms for supporting resource materials (such as Wakelet https://wakelet.com/); online polling platforms (e.g. Mentimeter https://www.mentimeter.com/); and online 'debating sites' (e.g. Kialo-edu.com https://www.kialo-edu.com/). An updated interactive 3D anatomical model to illustrate the anatomy of the neck relevant to forensic aspects of the application of pressure to the neck was also created (http://bit.ly/forensicneck).

In order to facilitate engagement and maximise flexibility for students to explore and reflect on course materials at their own pace – something that students had highlighted as being of particular value in previous years, given the emotional nature of some of the course materials - a list of suggested daily activities was constructed (supplementary box 1). This incorporated self-directed learning, group discussion – each student was allocated a virtual case-based learning (vCBL) study group at the start of the semester – and case study-related questions to be answered by each vCBL using MS Forms.

Students were encouraged also to submit any questions that they had about any of the course material via email or anonymously via a MS Form. The use of groupwork, albeit virtual, the submission of answers to case study questions, and the option of student question submission other than by email, were features new to the online course.

It was felt by the XXXX team that the final day ought to be set aside for a synchronous online 'wrap-up' (review) session and a voluntary session reviewing sample Situational Judgement Test (SJT) questions – exploring complex medicolegal and ethical issues relevant to the course materials – made available to the students throughout the week. This decision meant that no time would be available for one of the case studies explored in previous years, and a case study exploring abuse and neglect in the elderly was removed. Safeguarding vulnerable adults was to be explored in a separate case study on 'domestic and intimate personal violence', and it was intended that the

elderly adult case study might be offered as a separate topic to be covered later in the 'spiral curriculum', whilst the students studied the care of the elderly.

Due to logistical difficulties arranging Zoom conferences with the multi-disciplinary case study panellists, it was agreed with participants that three discussions would take place for the 'injury in childhood and infancy' case study (6 specialists separated into 'healthcare' and 'public protection' groups), and 'domestic and intimate partner violence' case study (one group of 5 specialists covering healthcare and public protection), and that such should be recorded for review by students, rather than trying to hold them synchronously with students also participating. Any questions students had arising from these discussions could be submitted via a MS Form, and addressed by whomever was best placed to do so.

It was not possible to recreate the practical demonstrations of de-escalation and physical restraint techniques used in healthcare settings, and by the police, but videos of exemplars of good practice were sourced from the internet.

When the online course was delivered, daily faculty administration 'oversight' was required, for example to monitor emails and questions submitted via MS Forms, ensure that links to online resources were active, and respond to interactions on the case study-related online 'debates. That vCBL group answers, and individual student questions, were not all received on those days corresponding to the 'suggested daily activities' - indicating perhaps that students were taking advantage of the flexible nature of the week to explore the course materials at their own pace – was unexpected, but easily managed because the administration oversight was performed by faculty familiar with the course as a whole, the resources made available on the VLE, and what was relevant to the ILOs for the week.

Student questions submitted via MS Forms or email appeared to reflect genuine engagement with the course materials, seeking clarification of factual and procedural knowledge that could be gained from those materials, the answers to which would benefit the wider student cohort.

For students interacting with the course hashtag on Twitter (XXXX), links to interesting current topics were Tweeted (XXXX), and some early encouraging Tweets from students were received.

How was the online course received by students?

Student engagement with the course

Some 299 students in 54 virtual small groups (vCBL groups) were eligible to take the course, 224 (75%) of whom attended the final day 'wrap up' Zoom session, and 183 (61%) of whom attended the voluntary SJT review session. A chat moderator[9] from the XXXX team monitored student's questions/ comments in 'real time', most of which were sent privately, and that moderator fed back to the other WIFM team members during the sessions so that answers could be provided.

In the SJT session, the moderator also managed the sharing of student-derived data for each sample question generated by polling software so that students could see how their answers compared with those of the XXXX team. The numbers of students polled ranged from 45 to 63 for the 5 sample questions.

17 questions were submitted (mainly via MS Forms), on topics ranging from the pathology of trauma to specific safeguarding procedures, all of which were addressed via answers provided on the VLE, as were suggested answers for questions relating to each case study.

As far as could be ascertained, and for those videos which had been made available via YouTube (https://www.youtube.com/), there were approximately 200 views per video during the course.

Student feedback

Students were invited to complete an online feedback questionnaire after the course; it was not considered necessary for ethical approval to be sought for this course evaluation. After a gentle reminder email had been sent, feedback was received from 62 students (20.7%), down from 27% in 2019, but which compared reasonably well with the average for 2015-2019 (23.5%).

95.2% agreed that the course would benefit their future medical practice, down slightly from 97.4% in 2019, but up slightly from an average of 94.4% between 2015 and 2019. 38.7% agreed that the course had stimulated a career in forensic medicine or forensic pathology – a decrease of just under 9% from 2019, but only 1.1% less than the average for 2015-2019.

Tables 1-3 illustrate student responses to questions relating to the format of the week and case studies (table 1), individual days of the course (table 2), and course ILOs relating to the 'language of trauma', vulnerability and safeguarding (table 3).

What was well-received?

The perceived level of 'intellectual challenge' increased by 3.5% on 2019 (and by 7.6% on the 2015-2019 average – table 1). Students enjoyed exploring the case studies (up 2.1% from 2019, and up 6.4% on the 2015-2019 average), and appreciated learning about the perspectives of the multi-disciplinary experts (up 1.8% on 2019, and up 9.9% on the 2016-2019 average).

The first 4 days of teaching were well-received (table 2), with increases in perceived usefulness compared with 2019 of: 15.3% for the 'language of trauma' (up 10.4% from the average for 2015-2019); 4.5% for 'injury in infancy and childhood' (up 11.1% from the average for 2015-2019); 3.1% for 'domestic and intimate partner violence' (up 12% from the average for 2015-2019); and 10.1% for 'dealing with challenging behaviour and physical restraint' (up 21.1% from the average for 2015-2019). Free text comments revealed that students appreciated the organisation and structure, particularly through the use of daily content folders on the VLE.

Perceived improvements in ILO-related items were seen in relation to the pathology of trauma, vulnerability and safeguarding (table 3). The biggest improvement (15.8% compared with 2019 and 21.7% compared with the 2015-2019 average) related to the perceived ability to critically analyse, evaluate, and reflect on data relevant to a death of a vulnerable patient. Whether such reflects an increased opportunity for self-directed learning, or the vCBL groupwork, is uncertain as no free text responses specifically addressed this matter.

The wrap-up session on the final day was thought to be useful/ very useful by 67.8%, whilst 79.1% found the SJT session useful/ very useful. Free text comments were received about the SJT session, indicating that it was 'phenomenal', and extremely useful to have as an introduction to such questions at an early stage in the medical curriculum.

What was not so well-received?

Disappointingly 18.5% fewer students agreed that they had enough time to review the case study materials compared with 2019 (and 19.3% fewer compared with the average for 2016-2019 – table 1). Free text responses addressed this issue, there being a tendency to feel somewhat overwhelmed by the amount of material to review, and a suggestion that such ought to be more clearly designated 'essential' versus 'desired'. Only 56.5% found the online curated digital resource collections – for

specific topics such as explosions and blast-related injuries, and the roles of specialists in safeguarding teams – useful/ very useful (supplementary table A). Others considered the workload 'challenging but not overwhelming', and a 'reasonable amount of content per day'.

Materials were specifically chosen to facilitate students' understanding of the subject matter relating to the 'theme of the day', utilising a variety of text-based, photographic and video resources. Such a variety was thought to compliment variable student preferences, the use of which might be 'self-managed' by individual students during their learning.

Some resources were explicitly identified for review 'if you are interested', although content within individual resources – including curated collections – were not segregated in such explicit terms. In order to streamline resources in future, and reduce the perceived burden on some students, they could be accompanied by a comment about their relevance to factual or procedural knowledge, or the ethical framework underpinning the subject, for example, to see if the student experience of course resources is improved.

Such an exercise would also serve to challenge faculty to consider whether the resources signposted are actually relevant to the ILOs, or which might be better placed in a resource for future reference.

Fewer students appreciated the mix of teaching and learning modalities compared with 2019 (down 4.6% - table 1); free text responses and feedback during the wrap-up session indicated that the absence of face-to-face teaching, and 'live demonstrations' were a disappointment. 92% found a wounds and injuries eLearning package useful/ very useful (71.1% in 2019), 83.9% found the VLE resource folders useful/ very useful (81.5% in 2019), and 82.2% found the newly created language of trauma videos useful/ very useful (supplementary table A).

Free text comments were silent as to why the language of trauma-related resources were perceived to be so useful, but it is possible that such reflects a previously noted tendency[1] for students to prefer the biomedical model of medicine over ethical and legal issues relevant to the wider context of the 'protection of the vulnerable' course.

Students perceived that they utilised existing anatomy and physiology less than they did in 2019 (down 11.9%), and slightly fewer students appreciated the advance warnings about potential distress than in 2019 (Table 1).

Whilst explicit links between external injuries and potential internal findings were incorporated into a series of narrated videos dealing with patterns of injury in assault, falls, and road traffic collisions, as well as videos exploring gunshot wounds, a perceived ability to describe potential internal injuries following external violence reduced by 4.9% (and by 3.9% on the average for 2015-2019 – table 3).

Medical ethics and law

Of relevance to the teaching of medical ethics and law at XXXX was the response to an ILO-related item dealing with pre-existing understanding of consent, confidentiality and capacity: the proportion of students who felt that their existing knowledge was sufficient to address the issues arising from the case studies fell by 27.5% compared with 2019 (and 17.3% compared with the average for 2015-2019 – table 3). One student suggested that a revision session on such topics ought to be held before the 'protection of the vulnerable' course.

It had been envisaged that such medicolegal and ethical considerations were to be incorporated into CBL taking place across the first two years of the 'C21' undergraduate course[1]. That ethics ought to be integrated throughout that curriculum was also recognised by Saad et al[12]. A 'Consensus

Statement by teachers of medical ethics and law in UK medical schools'[13], set out suggested components of an integrated curriculum, and was updated in 2010[14,15]: a recent survey of junior doctors in the UK suggested that teaching of medical ethics and law at medical school was reasonably comprehensive, although such could place more emphasis on a practical application to issues which arise in daily medical practice[16].

A review of the adequacy of the ability of the current CBL format of the XXXX curriculum to explore medicolegal and ethical issues would appear to the XXXX team to be required, perhaps as part of the inevitable review of online teaching being provided this academic year in response to the COVID-19 pandemic.

Free text responses to the SJT component of the 'protection of the vulnerable course' over the years have suggested that the integration of SJT-style questions, or the formulation of such by students in their CBL groups, might be a suitable vehicle by which students can consider ethical issues relevant to each case, provide an early opportunity for gaining familiarity with the question style – for what will be an important 'high-stakes' exam at the end of their studies, an exam which has come under scrutiny during the pandemic for being *"[…] unfair, unacceptable, and in some cases inhumane."*[17] – and lead to a question bank resource for the entire student cohort.

Discussion

In 'Getting to the core of medicine'[1] the development of this course in applied forensic medicine and forensic pathology was presented as a journey. The first iteration was designed as a blended learning experience, including e-learning, self-directed learning, and a substantial face-to-face teaching component, albeit such was not strictly didactic as it incorporated multi-disciplinary 'case conference' discussions.

Feedback from the first iteration of the course indicated that students were unprepared for the discursive interactions of these case study discussions, having had no exposure to clinical multi-disciplinary meetings where patient care and management options are discussed. Subsequent iterations of the course retained these panel discussions, but they followed a more structured format. The course was also re-balanced, reducing face-to-face teaching, and making more time available for self-directed study and reflection.

Since 2016, feedback-informed incremental changes were made until the need for the course to be delivered completely online required a fresh reappraisal of what it was the XXXX team wished students to explore during the week, and how best to facilitate that.

Developments in the teaching of forensic medicine and pathology to medical undergraduates have been described in the literature in recent years, including the creation of Objective Structured Practical Examinations (OSPEs)[18], Objective Structured Clinical Examinations (OSCEs) in post mortem examinations of the surface of a body using mannequins and death certification[19-21], and practical crime scene simulations[22]. Optional teaching modules ('Student Selected Components') have been described also[23], and curricula for students destined to become specialists in forensic pathology or clinical forensic medicine have been detailed[24,25]. The 'protection of the vulnerable' course remains unique in its focus on the application of forensic medicine and pathology to safeguarding the vulnerable, and an integration of multi-disciplinary expertise.

A blended learning approach again was thought to be the most suitable for an online 'protection of the vulnerable' course and, given the plethora of literature appearing during the summer of 2020, and the move to online teaching already made in medical schools across the world, it was clear that

there were technological solutions available to 'recreate' the essential elements of the course, as well as facilitate student engagement with the material.

The online learning experience

Whilst student feedback for the 2020 online 'protection of the vulnerable' course was, overall, very positive, and broadly similar to that received for previous iterations of the course, the literature describes the adverse impact the abrupt global switch to online learning has had on student satisfaction with their learning experience: 27% of first year students, and 36% of other undergraduate students in England, for example, expressed dissatisfaction with their learning experience or academic support, mainly because of the delivery and quality of learning[26].

Others have reported worse levels of dissatisfaction with the online learning experience[27]. Concerns have also been raised about participation, engagement and interaction with online teaching, although the effect on virtual 'attendance' is variable, and online group work was thought capable of bringing students together as a 'community of learners'[28]; whether vCBL groupwork has achieved this aim in XXXX cannot be addressed by the feedback received, and would appear to be a useful area for future research given that these groups have been relied upon whilst 'social distancing' rules have been in operation.

How an individual student responded to the move to online learning appeared also in the literature to depend somewhat on their personality, maturity, motivation, self-discipline, or an ability to take responsibility for their own learning[28-30], although barriers to effective engagement might also include insufficient digital literacy, a poor internet connection (including Wi-Fi signal and bandwidth), or family distractions[6,31-34].

Online and blended learning can improve students' organisational skills, and ability to process and synthesise content, which might explain the increase in the perceived ability of students to critically analyse, evaluate and reflect on data relevant to the death of a vulnerable patient, and the protection of the living, compared with previous years.

For teaching which does not require student-patient interaction, Dost et al[33] have recommended that medical schools combine online learning with students being able to discuss that material *in person* with their peers in order to achieve learning outcomes; social distancing rules at the time the online 'protection of the vulnerable' course was being prepared, and still in existence at the time of writing this article, preclude such *in person* groupwork and, given personnel factors at the XXXX, facilitation of such by XXXX team members in the future remains a challenge. It may be possible, however, to facilitate groupwork *virtually* in the future, perhaps using as a basis answers submitted to case study questions, to be reviewed at a daily 'wrap-up' session timed so as not to interfere with individual and group learning, or to disadvantage students with other responsibilities.

Students did engage with their *virtual* groupwork (in their vCBL groups) in this online 'protection of the vulnerable' course, with answers being submitted for case study questions on a daily basis; that more answer forms were received than there were vCBL groups (71, 61, and 60, respectively for days 2-4), indicated that at least some students submitted their own answers, however, rather than an agreed set of group answers.

Feedback about the reliance on such vCBL groups included the following:

> *"Something that the medical school [has] struggled with this year I think is engaging us in our case groups. I think that the [protection of the vulnerable course] could [have] perhaps been improved by giving groups sides of [a] case/ roles for them to research and present in*

an online tutorial ie for Archie's case have one group research/ arguing against it being NAI and one group for etc." (Respondent 69418447).

That such an approach might be valuable to students *was* considered in the development of the 2020 course, and online 'debates' were created for the case studies - 'Was Archie assaulted or was he injured in some other way?', and 'What legal and ethical responsibilities would you have for safeguarding Alice?', for example. These online debates were partially populated with opposing 'arguments' prior to the course to illustrate how the platform might be used, links to these debates were provided in the VLE resources for each case study, and students were invited to use them to help structure their thoughts (see supplementary box 1).

Only 2 students participated – by making claims/ comments online - in the debate for Archie's story (with 131 students 'viewing' the debate without adding their own claim/ comment), and only 1 student participated in the debate for Alice's story (with 113 students viewing the debate). Free text comments were silent about the utility or otherwise of the online debate platform: if the course remains entirely online in 2021 an explicit instruction to students might be to consider framing their group discussions as a debate, with sub-groups providing opposing views, utilising the online platform as a guide, as suggested by student feedback.

This student comment also speaks to the (anecdotal) view of a XXXX team member involved in CBL for years 1 and 2 that some students are experiencing a degree of 'group weariness' in CBL, particularly where group membership has remained static for many months and they have been meeting *virtually*. There is an entirely understandable wish for some variety in the group's approach to CBL and introducing a change in group dynamics via a debate may satisfy this very human desire.

Student wellbeing and distress

The development of the online course also required the XXXX team to consider carefully how sensitive materials, illustrating physical trauma for example, ought to be utilised, and how student wellbeing might be supported.

Concern for the wellbeing of undergraduate students pre-dates the COVID-19 pandemic: in the UK, students report much lower levels of wellbeing compared to the general population[35], and the number of students self-reporting a mental health condition has increased in recent years[36,37]. The so-called 'iGen' (born between 1995-2012) has been said to be *"[…] on the verge of the most severe mental health crisis for young people in decades."*[38]. Medical students in particular are at an increased risk of mental or psychological disorders compared with other students of the same age[39,40].

Student wellbeing appears also to have been affected adversely by the pandemic in the UK and globally, manifested by increased levels of anxiety and stress due, in part, to the abrupt loss of face-to-face learning opportunities, the shift to online learning, the loss of opportunities to socialise with family and peers, and financial pressures[28,39,41-45].

Medical schools in the UK are expected to provide an education that allows newly qualified doctors to meet the 'outcomes for graduates' set out by the General Medical Council (GMC), the most recent version of which[46] includes the ability to identify, and safeguard, vulnerable patients at risk of abuse or neglect.

The XXXX team believes that the construction and content of the 'protection of the vulnerable' course assists medical students achieve these necessary goals without exposing them to unavoidable distress. Medical students should not be insulated from potentially distressing material, but they

should be treated with respect and humanity and should be provided in advance with clear warnings about potentially distressing teaching material[1]. Student feedback received over the past 5 years has confirmed the usefulness of such an approach.

Great care has been taken throughout the development of the 'protection of the vulnerable' course to illustrate teaching materials only with sensitive materials that are pedagogically necessary, or to use means of illustrating injuries other than by photographs, such as 'body maps'[1]. Even though no identifiable patient data was present in the materials utilised in the course, it was felt that the wounds and injuries videos, for example, would only be made available via the VLE to which the students had secure access. If such were to be made more widely available on the internet, images of injuries etc. would have to be sourced from ethically published artefacts, such as journal articles or textbooks, or from sources where consent for public educational purposes had been given. A concerted global effort by the forensic medical community ought to make such an endeavour possible.

Whilst students were advised that if they were distressed by any of the subject matter during the week, they could talk to someone from the XXXX team, or in the university's support team dedicated to medical students, additional sources of support were 'signposted' (supplementary box 2), and resources relating to mental wellbeing and resilience were incorporated into the VLE. That the course materials might be inadvertently seen by someone other than the student viewing them – causing *them* distress - was also considered, prompting a suitable warning to be made to all students on the VLE 'home page', as has been recommended by other educators utilising 'sensitive materials' online[47].

Free text comments suggesting further improvements that the XXXX team might take to reduce student distress included:

> *"Maybe add some light at the end of the tunnel; put some positive spins on the cases perhaps. It's a very depressing and distressing week otherwise, regardless of its utility."* (Respondent 70558755).

This raises an interesting point about how our constructed, but authentic, case studies might be modified in such a way as to illustrate a scenario in which medicolegal awareness – of the sort being modelled in the 'protection of the vulnerable' course – might successfully avert a fatal outcome.

In fact such *was* already built into the domestic and intimate partner violence case study ('Alice's story'), in which the young mother of two young children – one of whom (Archie), the subject of the 'injury in infancy and childhood' case study, was fatally injured – attended hospital to visit her injured son and was seen by nursing staff to have injuries concerning for assault on her face and neck. Alice represents exactly the sort of vulnerable patient who might benefit from safeguarding, and students are explicitly asked to explore why such protection ought to be considered, and how it might be effected by them in practice. The multi-disciplinary expert panel discussion too explored those issues, as well as safeguarding Archie's apparently uninjured sibling.

'Positive outcomes' for the remaining case studies are not possible in their current format, but students are advised in the final day wrap-up session that the aim of the week is to provide them with the knowledge to identify signs suggestive of abuse and neglect in their (living) patients, and to consider what safeguarding steps are required. By applying their knowledge of forensic medicine in this way, they might themselves facilitate a 'positive outcome' for their patient.

> *"I felt this worked well online as I got quite emotional during some of the videos and I think that would have been quite challenging if we were doing the exercise in person in groups."* (Respondent 70595386).
>
> *"Thought it was quite disappointing that there were no live sessions and it was all prerecorded, especially for such distressing content. […] No real way of monitoring students' engagement or how well they managed with the material – especially given the current circumstances and the need for greater support with studies. Also made it feel like the content was basically optional which it definitely should not be."* (Respondent 71613606).

These comments raise questions about the most appropriate mode of delivery for potentially distressing teaching materials, and it would appear that some students would prefer to explore them on their own, allowing them to process their feelings in private, whilst others would prefer to approach the material with their peers.

Peer support would have been available during the online course - during the required vCBL discussions - but, in order to maximise flexibility for student learning, no daily case study-related 'wrap-up' sessions were offered. Such flexibility was appreciated by some students: *"I really liked the flexibility of being able to do a lot of the content in my own time."* (Respondent 70009465).

An option under consideration for the future is to hold a brief (10 minute) *virtual introduction* to each day[48] – to 'set the scene', identify the suggested activities for the day, and remind students of sources of support if they become distressed – as well a daily virtual 'wrap-up' session. Given that only 56.5% of students agreed/ strongly agreed that they had enough time to review the case study materials in the 2020 course, however, the timing of any future daily virtual sessions would need careful thought so as not to further reduce students' ability to engage with course materials.

Conclusion

Following the delivery of the first two iterations of the 'protection of the vulnerable' course, it was concluded that forensic medicine and pathology remained relevant to undergraduate medical education, and that forensic practitioners were well-placed to help prepare students for their future roles as healthcare practitioners capable of safeguarding their patients[1]. This course has been described elsewhere as an 'important stride' to address deficiencies in the teaching of the subject to undergraduates[49].

Whilst the course evolved as a blended learning experience, with a substantial face to face teaching component, the restrictions on the provision of higher education that followed the COVID-19 pandemic required a different approach, and the course had to be adapted so that it could be delivered online.

Based on student feedback, this online 'pandemic edition' of the course was well-received, compared favourably with feedback from previous years, and continues to demonstrate the relevance to undergraduate medical students of the application of forensic medicine and pathology to the safeguarding of vulnerable patients.

It is hoped that this narrative will assist others who might be contemplating implementing similar teaching[50] and provide a resource upon which the global forensic medicine and pathology education community could draw.

References

1. Jones RM. Getting to the core of medicine: developing undergraduate forensic medicine and pathology training. Journal of Forensic and Legal Medicine. 2017; 52:245-251.
2. Deacon T. How coronavirus changed Wales forever in 2020. Wales Online. 31/12/2020 https://www.walesonline.co.uk/news/wales-news/coronavirus-wales-2020-timeline-changes-19479013. (Accessed last on 2/3/2021).
3. Riordan C. Move to remote learning, teaching and assessment - Message from the Vice-Chancellor to students - 16/03/2020. https://www.cardiff.ac.uk/media/media-statements/statements-on-coronavirus-covid-19/move-to-remote-learning,-teaching-and-assessment-message-from-the-vice-chancellor-to-students-16032020. (Accessed last on 2/3/2021).
4. Riordan C. Message from the Vice Chancellor 16/3/2020. https://www.cardiff.ac.uk/media/media-statements/statements-on-coronavirus-covid-19/message-from-the-vice-chancellor-160320. (Accessed last on 2/3/2021).
5. Fazackerley A. Forget freshers' week: universities prepare to teach new first years online. The Guardian. Fri 3 Apr 2020. https://www.theguardian.com/education/2020/apr/03/forget-freshers-week-universities-prepare-to-teach-new-first-years-online#maincontent. (Accessed last on 2/3/2021).
6. Gordon M, Patricio M, Horne L et al. Developments in medical education in response to the COVID-19 pandemic: a rapid BEME systematic review: BEME Guide No. 63. Medical Teacher. 2020; 42:1202-1215.
7. Daniel M, Gordon M, Patricio M et al. An update on developments in medical education in response to the COVID-19 pandemic: a BEME scoping review: BEME Guide No. 64. Medical Teacher. 2021; DOI: 10.1080/0142159X.2020.1864310.
8. Gill D, Whitehead C, Wondimagegn D. Challenges to medical education at a time of physical distancing. Lancet. 2020; 396:77-79.
9. Hilburg R, Patel N, Ambruso S et al. Medical education during the coronavirus disease-2019 pandemic: learning from a distance. Advances in Chronic Kidney Disease. 2020; 27:412-417.
10. Camargo CP, Tempski PZ, Busnardo FF et al. Online learning and COVID-19: a meta-synthesis analysis. Clinics. 2020; 75:e2286.
11. Goh P-S, Sanders J. A vision of the use of technology in medical education after the COVID-19 pandemic. MedEdPublish. 2020; 9(1):49 https://doi.org/10.15694/mep.2020.000049.1 .
12. Saad TC, Riley S, Hain R. A medical curriculum in transition: audit and student perspective of undergraduate teaching of ethics and professionalism. Journal of Medical Ethics. 2017; 43:766-770
13. Consensus Statement by teachers of medical ethics and law in UK medical schools. Teaching medical ethics and law within medical education: a model for the UK core curriculum. Journal of Medical Ethics. 1998; 24:188-192.
14. Stirrat GM, Johnston C, Gillon R et al. Medical ethics and law for doctors of tomorrow: the 1998 Consensus Statement updated. Journal of Medical Ethics. 2010; 36:55-60.
15. Papanikitas A. Medical Ethics and Sociology. Crash Course. 2nd Edition. London: Mosby/ Elsevier; 2013.
16. Machin LL, Latcham N, Lavelle C et al. Exploring the perceived medical ethics and law training needs of UK foundation doctors. Medical Teacher. 2020; 42:92-100.
17. Nabavi N. BMA calls for urgent review of online exam for medical students. BMJ. 2021; 372:n253.
18. Gupta S, Parekh UN, Ganjiwale JD. Student's perception about innovative teaching learning practices in Forensic Medicine. Journal of Forensic and Legal Medicine. 2017; 52:137-142.

19. Heide S, Lessig R, Hachmann V et al. Establishment of two forensic medicine OSCE stations on the subject of external post-mortem examination. International Journal of Legal Medicine. 2018; 132:311-319.
20. Biolik A, Heide S, Lessig R et al. Objective structured clinical examination "Death Certificate" station – Computer-based versus conventional exam format. Journal of Forensic and Legal Medicine. 2018; 55:33-38.
21. Flössel U, Clas S, Willemer M et al. Using simulation mannequins and actors in training for external post-mortem examinations – experiences from use in medical students and police officers. Journal of Forensic and Legal Medicine. 2021; 77:102102.
22. Eraña-Rojas IE, Cabrera MVL, Barrientos ER, Membrillo-Hernández J. A challenge based learning experience in forensic medicine. Journal of Forensic and Legal Medicine. 2019; 68:101873.
23. Kennedy KM, Wilkinson A. A student selected component (or special study module) in forensic and legal medicine: design, delivery, assessment and evaluation of an optional module as an addition to the medical undergraduate core curriculum. Journal of Forensic and Legal Medicine. 2018; 53:62-67.
24. Zhou N, Wu Q-p, Su T et al. Teaching forensic pathology to undergraduates at Zhongshan School of Medicine. Medicine, Science and the Law. 2018; 58:109-114.
25. Guo Y, Cheng Z, Ding Y, Cai J. Educating for practice: a new redesigned pedagogical model of clinical forensic medicine. Journal of Forensic and Legal Medicine. 2020; 76:102064.
26. Gibbs T. Coronavirus and higher education students: England, 20 November to 25 November 2020. Office for National Statistics. 9th December 2020. Available online at https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/bulletins/coronavirusandhighereducationstudents/england20novemberto25november2020. (Accessed last on 2/3/2021).
27. Dhahri AA, Arain SY, Memon AM et al. "The psychological impact of COVID-19 on medical education of final year students in Pakistan: a cross-sectional study". Annals of Medicine and Surgery. 2020; 60:445-450.
28. Jump P. The great move online. Times Higher Education. No. 2475 4th-17th February 2021 (pages 32-45).
29. Vanslambrouck S, Zhu C, Lombaerts K et al. Students' motivation and subjective task value of participating in online and blended learning environments. The Internet and Higher Education. 2018; 36:33-40.
30. Puljak L, Čivljak M, Haramina A et al. Attitudes and concerns of undergraduate university health sciences students in Croatia regarding complete switch to e-learning during COVID-19 pandemic: a survey. BMC Medical Education. 2020; 20:416.
31. Rafi AM, Varghese PR, Kuttichira P. The pedagogical shift during COVID 19 pandemic: online medical education, barriers and perceptions in central Kerala. Journal of Medical Education and Curricular Development. 2020; 7:1-4.
32. Losh E. We must not presume students are teach-savvy. Times Higher Education. No. 2475 4th-17th February 2021 (page 30).
33. Dost S, Hossain A, Shehab M et al. Perceptions of medical students towards online teaching during the COVID-19 pandemic: a national cross-sectional survey of 2721 UK medical students. BMJ Open. 2020; 10:e042378. Doi:10.1136/bmjopen-2020-042378
34. Trueland J. Lecture over – medical education in the time of COVID-19. BMA – News and opinion online. https://www.bma.org.uk/news-and-opinion/lecture-over-medical-education-in-the-time-of-covid-19. (Accessed last on 2/3/2021).

35. Neves J, Hewitt R. Student academic experience survey 2020. Advance HE/ Higher Education Policy Institute 2020. Available online at https://www.hepi.ac.uk/2020/06/11/the-student-academic-experience-survey-2020/. (Accessed last on 24/2/2021).
36. Thorley C. Not by degrees. Improving student mental health in the UK's universities. Institute for Public Policy Research. 2017. Available online at https://www.ippr.org/research/publications/not-by-degrees. (Accessed last on 2/3/2021).
37. Tinsley B. Coronavirus and the impact on students in higher education in England: September to December 2020. Office for National Statistics. 21/12/2020. Available online at https://www.ons.gov.uk/peoplepopulationandcommunity/educationandchildcare/articles/coronavirusandtheimpactonstudentsinhighereducationinenglandseptembertodecember2020/2020-12-21. (Accessed last on 2/3/2021).
38. Twenge JM. iGen. Why today's super-connected kids are growing up less rebellious, more tolerant, less happy – and completely unprepared for adulthood. New York, NY: Atria; 2017.
39. Sharma D, Bhaskar S. Addressing the Covid-19 burden on medical education and training: the role of telemedicine and tele-education during and beyond the pandemic. Frontiers in Public Health. 2020; 8:589669.
40. Findyartini A, Greviana N, Putera AM et al. The relationships between resilience and student personal factors in an undergraduate medical program. BMC Medical Education. 2021; 21:113.
41. Hewitt R. Students' views on the impact of Coronavirus on their higher education experience in 2020/21. Higher Education Policy Institute. December 2020. Available online at https://www.hepi.ac.uk/2020/12/03/students-views-on-the-impact-of-coronavirus-on-their-higher-education-experience-in-2020-21/. (Accessed last on 2/3/2021).
42. National Union of Students (NUS). Coronavirus student survey phase III – mental health and wellbeing. November 2020. Available online at https://www.nusconnect.org.uk/resources/coronavirus-and-students-phase-3-study-mental-health-with-demographics-nov-2020. (Accessed last on 2/3/2021).
43. Hubble S, Bolton P. Coronavirus: implications for the higher and further education sectors in England. House of Commons Library Briefing Paper No. 8893. 17th April 2020. Available online at https://commonslibrary.parliament.uk/research-briefings/cbp-8893/. (Accessed last on 2/3/2021).
44. Chinelatto LA, da Costa TR, Medeiros VMB et al. What you gain and what you lose in COVID-19: perception of medical students on their education. Clinics. 2020; 75:e2133.
45. Rajab MH, Gazal AM, Alkattan K. Challenges to online medical education during the COVID-19 pandemic. Cureus. 2020; 12:e8966.
46. General Medical Council. Outcomes for graduates 2018. Updated November 2020. Available online at https://www.gmc-uk.org/education/standards-guidance-and-curricula/standards-and-outcomes/outcomes-for-graduates/outcomes-for-graduates. (Accessed last on 2/3/2021).
47. Thompson TJU, Earwaker H, Horsman G et al. Forensic undergraduate education during and after the COVID-19 imposed lockdown: strategies and reflections from India and the UK. Forensic Science International. 2020; 316:110500.
48. Myers G. Beyond the technology: student's view – responding to COVID-19. Jisc Podcast. 28/5/2020. https://www.jisc.ac.uk/podcasts/beyond-the-technology-students-view-responding-to-covid-19-28-may-2020# (Accessed last on 4/3/2021)
49. Vanezis P. Education and training in forensic medicine in United Kingdom: fit for purpose? Medicine, Science and the Law. 2021; 61(1S):5-6.

50. Luke K. Twelve tips for managing change in medical education. MedEdPublish. 2021; 10(1):53 https://doi.org/10.15694/mep.2021.000053.1.

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Table 1. Student feedback questionnaires 2015-2020 – The format of the week and case study-related.

Format of the week/ case study-related	2015-2019 (n=1479)		2019 (n=280)		2020 (n=299)	
	Agree/ strongly agree (av %)	Disagree/ strongly disagree (av %)	Agree/ strongly agree (%)	Disagree/ strongly disagree (%)	Agree/ strongly agree (%)	Disagree/ strongly disagree (%)
Format of the week						
I appreciated the advance warnings about potential distress relating to the topics covered during the week	(2016-2019) 80.0	(2016-2019) 4.4	85.5	5.2	80.7	3.2
I appreciated having a mixture of self-directed learning, presentations, case discussions and demonstrations (Note 1)	-	-	80.4	5.2	75.8	11.3
I was intellectually challenged by the topics discussed	61.7	14.0	65.8	11.8	69.3	16.1
I utilised existing anatomy and physiology knowledge during the course (Note 2)	-	-	61.9	11.8	50.0	14.5
Case study-related question						
I enjoyed exploring issues relevant to the cases	75.9	6.1	80.2	6.5	82.3	6.5
I appreciated learning about the different perspectives of the multi-disciplinary panel members	(2016-2019) 70.8	(2016-2019) 6.4	78.9	7.9	80.7	8.1
I had enough time to review the case study materials	(2016-2019) 75.8	(2016-2019) 7.9	75.0	5.2	56.5	11.3

Note 1. 2020 course had no 'live' demonstrations

Note 2. This question was split in 2015-2018: **I utilised existing anatomy knowledge during this week (2015-2018)** 56.7 av % strongly agree/ agree; 14.2 av % strongly disagree/ agree **and I utilised existing physiology knowledge during this week (2015-2018)** 49.0 av % strongly agree/ agree**;** 18.0 av % strongly disagree/ agree.

Table 2. Student feedback questionnaires 2015-2020 – The teaching sessions.

Teaching session	2015-2019		2019		2020	
	Useful/ very useful (av %)	Not useful/ not at all useful (av %)	Useful/ very useful (%)	Not useful/ not at all useful (%)	Useful/ very useful (%)	Not useful/ not at all useful (%)
Language of trauma	79.9	3.5	75.0	5.2	90.3	1.6
Injury in infancy & childhood	77.6	2.6	84.2	3.9	88.7	3.2
Intimate partner & domestic violence	76.7	3.3	85.6	1.3	88.7	3.2
Dealing with challenging behaviour and restraint	62.7	7.8	73.7	0	83.8	6.4

Table 3. Student feedback questionnaires 2015-2020 – Intended learning outcome-related (wounds and injuries, vulnerability and safeguarding).

Perceived ability following the course (explicit ILO-related)	**2015-2019**		**2019**		**2020**	
	Agree/ strongly agree (av %)	**Disagree/ strongly disagree (av %)**	**Agree/ strongly agree (%)**	**Disagree/ strongly disagree (%)**	**Agree/ strongly agree (%)**	**Disagree/ strongly disagree (%)**
Wounds and injuries-related						
I am aware of usefulness of evaluating patterns of injury when attempting to determine how a patient sustained an injury	87.3	1.5	89.5	1.3	93.5	0
I can identify and describe wounds and injuries caused by blunt and sharp trauma	85.3	1.7	82.9	2.6	90.3	0
I can distinguish between wounds and injuries caused by blunt and sharp force trauma	86.8	0.5	84.2	1.3	87.1	0
I can recognise those patterns of injury which suggest inflicted injury in infancy and childhood	83.7	2.3	79.0	2.6	85.5	0
I can recognise those patterns of injury which suggest 'domestic and intimate partner violence'	78.0	2.0	76.4	2.6	80.6	0
I can describe potential internal injuries which might follow external violence	70.0	4.8	71.0	2.6	66.1	6.4
Vulnerability and safeguarding-related						
I appreciate the circumstances in which my patient might be 'vulnerable' to abuse, assault or neglect	85.5	1.5	86.8	1.3	93.5	1.6
The week gave me an insight into how doctors can ensure that their practice considers legal and ethical obligations at the most appropriate times	74.0	3.4	81.3	2.7	93.5	3.2
I appreciate the range of people who might have questions about a death	79.6	2.1	81.6	2.6	87.1	4.8
The week gave me an insight into how doctors interact with other agencies when identifying and safeguarding patients who might be 'vulnerable' or at risk of abuse or neglect	77.4	2.4	81.5	1.3	85.5	1.6
I appreciate the medicolegal and ethical issues relevant to the recognition and care of the 'vulnerable patient'	70.4	5.1	78.9	2.6	80.7	8.1
I can critically analyse, evaluate and reflect on the significance of clinical (and other) data relevant to the death of a 'vulnerable patient', and the protection of the living	57.3	6.9	63.2	6.6	79.0	3.2
My existing understanding of capacity, informed consent and confidentiality was already sufficient to address issues studied	59.2	12.8	69.4	2.7	41.9	25.8

Competing interests statement

None