

1 Disembodied, dehumanised but safe and feasible: the social-spatial flow of a
2 pandemic OSCE

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Abstract

Introduction

The Objective Structured Clinical Examination (OSCE) is a key feature of healthcare education assessment. Many aspects of the OSCE are well-investigated, but not so its sociomaterial assemblage. The Covid-19 pandemic provided a unique opportunity to (re)consider taken-for-granted OSCE practices. Drawing on Law’s modes of ordering our aim was to demonstrate the “mangle of practice” between space and people; the spatialised and spatialising processes of an OSCE.

Methods

We used a case study approach to critically examine a redesigned final year MBChB OSCE held during the pandemic. We used multiple sources of data to attune to human and non-human actors: OSCE documentation, photographs, field notes and semi-structured interviews with OSCE staff/organizers. Law’s modes of ordering was used as an analytical lens to critically consider how people and things flowed through the adapted OSCE.

Findings

The overarching ordering was the delivery of a “pandemic safe” OSCE. This necessitated reordering of ‘usual’ process to deliver a socially distanced, safe flow of human and non-human actors through the assessment space. Each change had material and social “knock on” effects. We identified three main inter-related orderings: Substituting technologies for bodies: Disembodied and dehumanized but feasible; Flow through space: Architectural affordances and one-way traffic; Barriers to flow: Time and technology.

Discussion

Looking at the OSCE through a sociomaterial lens allows us to critically examine the OSCE’s essential and complex processes and the restrictions and affordances of the spaces and props within the OSCE. In doing so, we open the possibility of considering alternative ways of doing OSCEs in the future. Moreover, conceptualizing the OSCE as a living set of socially (human) and materially (nonhuman) enacted processes, changes the social perception of the OSCE and highlights that an OSCE has agency on people, places and things.

1 **Introduction**

2

3 The Objective Structured Clinical Examination (OSCE) format is a key feature of
4 healthcare education assessment. Extensive research has focused on examining the
5 psychometric properties of OSCEs,(1–4) how raters judge students (5,6) and student
6 and examiners’ perceptions of OSCE exams.(7,8) On the other hand, consideration
7 of the social, material and environmental assemblage of the OSCE has been
8 relatively neglected. Yet this is important to study: as per Fenwick, materials
9 “fundamentally shape [medical] practice as well as medical knowledge.” (p.46).(9)
10 Rather than “things” being merely a backdrop for human action, they are actants in
11 the relationship between human and material.(10) The spaces and objects inherent
12 in an OSCE and how these dynamically interact with people may have
13 consequences and are thus worthy of our attention.(11)

14

15 We are not the first to propose that the materiality of the OSCE matters because it
16 effects educators thinking and planning with respect to what can and cannot be
17 assessed, the manner in which it is assessed and candidate experience and
18 performance.(12–14) However, to date, there are no empirical studies in this area:
19 Tai and colleagues looked at how emergent combinations of social and material
20 arrangements of examination arrangements impacted on students with disabilities,
21 but their focus was the materiality of written assessments, not OSCEs.(15) We would
22 argue that an OSCE has a different and even more complex assemblage than a
23 written examination. OSCE delivery and administration are enmeshed with material
24 actors of all kinds: buildings, virtual or physical spaces, desks, beds, iPads and
25 checklists, human and nonhuman bodies, procedural equipment, and so on. There
26 is a choreographed flow of students through OSCE stations, from A to B to C, often
27 managed by alarms and bells, written instructions and instructors. There are
28 restraints on who can go where and when.(16) The OSCE space is filled with people
29 - candidates, examiners, volunteer and real patients and staff, all attempting to
30 coordinate a “show” with the help of many different props.(17) In short, the
31 “everyday organizing [*of an OSCE*] is inextricably bound up with materiality”
32 (p1435).(18)

33

1 A sociomaterial perspective of OSCEs may be particularly pertinent in relation to the
2 recent Covid-19 pandemic. Social distancing and other restrictions resulted in
3 dramatic changes in the design and enactment of healthcare delivery,(19,20) training
4 (21,22) and assessments.(23,24) In respect of the last of these, Covid-19 disrupted
5 the standard format of OSCEs. National and local guidelines designed to protect the
6 safety of all participants and minimise risk (by, for example, social distancing) had to
7 be taken into consideration in OSCE planning. Some OSCEs moved online, others
8 took place face-to-face but with major adjustments to, for example, timing, format
9 and number of stations, how students, simulated patients (patient partners) and staff
10 flowed through the OSCE space. This disruption to the system made matters
11 usually in the background more visible and foregrounded essential material
12 components of the OSCE.

13

14 The Covid-19 pandemic and its associated restrictions forced the medical education
15 community to pause to (re)consider the taken for granted practices of the OSCE.
16 Leveraging this opportunity, and drawing on a sociomaterial approach, specifically
17 Law's modes of ordering(25), our position is that people are not disconnected from
18 the spaces they inhabit, and space and its use is formed through interaction with
19 living and non-living entities.(26–28) Law describes modes of ordering as like
20 "Foucauldian mini-discourses" that run through, shape and are enacted in the
21 materially heterogenous processes of arranging and ordering within a place and
22 space. Ordering can be considered as a continuing process of a system pulling itself
23 apart and putting itself together, with the non-human having as much of a role to play
24 as the human in this process.(25) In short, Law's modes of ordering attempts to
25 attribute general patterning strategies to assemblages of people, materials, rules and
26 regulations.

27

28 By adopting this sensitising concept our aim is to demonstrate the "mangle of
29 practice"(29) between space and people; in other words, the spatialised and
30 spatialising processes of a pandemic OSCE. What opportunities did the reordering
31 offer us (affordances) in this new way of doing things and what did it not allow us to
32 do (restrictions)? (Readers may find Table 1 in Macleod et al. useful for glossary of
33 terms used in sociomaterial research)(30)

1 Our specific research question was: how do sociomaterial arrangements order the
2 flow of an OSCE? Specifically, we attuned to the ways in which social and material
3 elements come together and fall apart in the context of the OSCE.

4

5

1 **Methods**

2
3 We took an intrinsic case study approach where the case is of interest in itself.(31)
4 This study design involves critically examining a real-life setting or event using
5 multiple sources of evidence to capture context. The case study approach is
6 compatible with a range of different epistemologies. Our approach was relational,
7 underpinned by the assumption that actors (both people and things) achieve their
8 form and attributes because of their relations with other actors. Bringing a
9 sociomaterial lens to our case thus allowed us to “carefully and deliberately theorize
10 materiality” using multiple methods to consider both human and non-human
11 elements.(30)
12

13 **Study setting and Context**

14 Our setting was a medium-sized (approximately 190 students per year),
15 undergraduate UK medical school with a purpose-built healthcare teaching and
16 learning centre situated on a hospital campus. The building, opened in 2009,
17 contains a mixture of flexible spaces; small group working rooms, larger simulated
18 ward-based areas, office space, social spaces, corridors and stairwells, a conference
19 room, lecture theatre and a café. The building hosts most campus-based medical
20 school teaching, teaching for other healthcare professionals, and undergraduate and
21 postgraduate OSCEs. Our focus in this paper is a face-to-face OSCE, redesigned to
22 comply with Covid-19 regulations (see Box 1) in May 2021. In our usual practice the
23 OSCE contains 12 stations (six stations each day with each candidate sitting both
24 days), held on six sites within one physical building in one city, with six runs each
25 day, for approximately 200 final-year medical students. During Covid-19, taking
26 national and local Covid-19 guidelines into consideration, the OSCE went hybrid: six
27 virtual stations plus six face-to-face stations. In the Covid-19 OSCE, the six face-to-
28 face *stations* were held at 4/5 sites across two buildings in different cities, with 3/4
29 runs each day with students sitting all six stations in one day.
30

31 **Box 1 about here**
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1 **Data collection**

2 We used multiple sources of evidence and layered data collection strategies to allow
3 us to familiarise ourselves to both humans and non-human data sources, and the
4 interplay between the various actors. These were:

- 5 • Existing documentation (e.g., OSCE documents such as OSCE floor plans
6 and questions, held by CB [OSCE Coordinator]). There were nine individual
7 documents, including electronic OSCE floor plans for current and previous
8 (non-Covid-19) OSCE (n=2), the 'site and run' timings grid (n=1), electronic
9 copies of all OSCE questions (n=6) used during the Covid-19 OSCE and the
10 exam-board presentation (n=1) demonstrating the changed processes during
11 the Covid-19 OSCE.
- 12 • Thirty-two photographs taken during the OSCE set-up period and on the day
13 of the OSCE by CB (11-13/5/2021). Photographs are snapshots of time and
14 space and enabled us to examine the material assemblages of space and
15 how things were ordered and used.(32,33)
- 16 • Field notes made during the OSCE process (by CB). These helped
17 contextualise the photos and aided analysis (see later).
- 18 • Semi-structured interviews involving key OSCE stakeholders (n=6).

19 As a first step we considered the documentation, field notes and photographs to
20 identify and orientate to the sociomaterial assemblages within the OSCE. Next we
21 developed a semi-structured interview schedule(34) informed by insights garnered
22 through this document and picture analysis, reading relevant literature (13,14,32)
23 and discussions both within the team and more widely with those involved in
24 organising and delivering OSCEs during the pandemic. Interview questions were
25 designed to explore the participant's role within the newly conceptualized OSCE
26 process and their experience of the impact of Covid-19 on the space and
27 sociomaterial aspects of the assessment.

28

29 We used photographs and documents in two ways.(32,35) First, as data
30 documenting the materials of the space; that is, as a means of showing how people
31 and things related to each other during the OSCE (as explained above). Second, we
32 printed out the photographs and floor plans to use as prompts for discussion within
33 the interviews (researcher-driven photo-elicitation approach)(32) Participants were

1 shown the photos/plans and invited to select any they wished to discuss. Used in
2 this way, the photographs and floor plans paralleled the purpose of an open question
3 in a semi-structured interview; that is, to elicit verbal data plus participants'
4 interpretations of the images, drawing from and reflecting their OSCE experiences.
5 The photographs also served as a physical reminder to reflect upon the material
6 conditions in which the OSCEs occurred.

7

8 Interview participants were recruited using purposive sampling.(36) We purposively
9 sampled those individuals who had central roles in the organisation and delivery of
10 OSCEs generally, and who had also been involved in the OSCE under study. This
11 included members of staff whose voices are typically unheard in health professions
12 education (HPE) and HPE research, such as technicians, the building manager,
13 patient partner coordinator and so on.(37)

14

15 CB or LH conducted six face-to-face interviews in person, from October to December
16 2021 (269 minutes of interview data, average interview length of 41 minutes). The
17 interview schedule ensured consistency, but interviews were iterative and continued
18 until the participant felt he or she had shared their experiences sufficiently.
19 Consistent with sociomaterialism, we considered each interview as a means for us to
20 learn of human and non-human interactions and associations that we could not
21 directly observe.

22

23 **Data analysis**

24 Interviews were digitally audio-recorded for later transcription, then anonymised
25 throughout the transcription process. Transcripts were entered into the qualitative
26 data analysis software NVivo v12.0 (QRS International Pty Ltd, Doncaster, Victoria,
27 Australia) to facilitate data management and coding.

28

29 In the second phase of our study, after thoroughly familiarizing ourselves with the
30 data corpus of interview and photograph data, we worked as a team to organize the
31 data, repeatedly revisiting it to generate meaning in relation to our research question,
32 ultimately identifying patterns and connections. In respect of the photos, we carefully
33 evaluated and interpreted the images focusing on what was represented, as well as

1 what was absent.(38) We then used Law’s modes of ordering as an analytical lens
2 to see how people and things flowed through the adapted OSCE.(25,39)

3

4 Modes of Ordering are defined as recurring patterns embodied within, witnessed by,
5 generated in, and reproduced as part of the ordering of human and non-human
6 relations. Within the realm of OSCE, the complex arrangement of people and things,
7 expertise and ideas, checklists and thinking, is certainly amenable to such analysis.

8 This approach allowed us to consider the processes through which the
9 reconceptualized OSCE was organised and enacted, as well as the materials,
10 relationships and activities through which this ordering takes place.

11

12 Our analytical technique drew on a modified constant comparison method, originally
13 described by Booth and colleagues.(40) We developed a bespoke constant
14 comparative approach that required ongoing reflection and revision to our emerging
15 interpretation as we followed the actors and documented the ever-evolving nature of
16 OSCE practices.

17

18 Our goal was to illuminate the “Blackbox” of the OSCE. We recognized that our
19 collective familiarity with OSCEs, and the way they’re *supposed* to work, may have
20 obscured the keenness of our observations and analytical conversations. Therefore,
21 we deliberately focused on the interactions between multiple actors, rather than on
22 the OSCE as an overarching process.

23

24 We narrowed our analytical lens to document how people moved through, and
25 interacted with, the spaces in which the revised OSCE occurred. Because OSCE
26 assemblages endure across space and time, and include an infinite number of
27 possible interactions, we set the parameter of describing interactions between
28 people and spaces to balance meaningful insights with the practical realities of our
29 project. Practically speaking, we considered each data source individually then we
30 interpreted data for the project as a whole. Two researchers (CB and LH) took the
31 lead on coding the data and shared their interpretations and analysis with a larger
32 group for consideration.

33 We managed any coding disagreements through discussion.

34

1 **Reflexivity**

2 In keeping with sociomaterial perspectives, we positioned ourselves not as external
3 viewers of the world or part of the world but active 'agents' in within the assemblage
4 being studied.(11,41,42) We considered this constantly and critically, reflecting on
5 our different relationships with the OSCE under study (e.g., CB is OSCE
6 Coordinating Lead and took the photographs used as data and to elicit discussion in
7 the interviews, LH is not involved in the OSCE process itself however works inside
8 the building where the assessment was held and has previously studied aspects how
9 the building is used.(43) JC and AM are outsiders to this particular OSCE but familiar
10 with OSCE processes generally, and different historical sociomaterial assemblages
11 related to our backgrounds (e.g., medicine, psychology, sociology and nursing),
12 theoretical interests and knowledge, and research experience. Note also that CB
13 was both researcher and interview participant because of his OSCE coordinating
14 role so, in line with sociomaterial orientations, his work practices were actively
15 enmeshed in the OSCE in its becoming.

16

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1 **Ethical approval**

2 Ethical permission for this study was granted by the College Ethics Review Board of
3 the College of Life Sciences and Medicine, University of Aberdeen.

4 (CERB/2021/7/2136)

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6

1 **Results**

2

3 The overarching key ordering during the pandemic was the delivery of a “pandemic
4 safe” OSCE. This necessitated reordering of ‘usual’ OSCE process to deliver a
5 socially distanced and hence safe flow of human and non-human actors through the
6 assessment space. Each change necessitated by the need to socially distance had
7 material and social “knock on” effects. We identified three main inter-related changes
8 in respect to the modes of ordering at play. These were:

- 9 1. Substituting technologies for bodies: Disembodied and dehumanized but
10 feasible
- 11 2. Flow through space: Architectural affordances and one-way traffic
- 12 3. Barriers to flow: Time and technology

13

14 **Change 1: Substituting technologies for bodies: Disembodied and** 15 **dehumanized but feasible**

16 Patient partners were not allowed on campus during Covid-19, and thus OSCE
17 stations which usually involved a patient partner (e.g., communication and
18 examination skills) had to be modified. This involved halving the number of face-to-
19 face practical stations, from 12 to six and shifting communication skills stations to
20 video consultations.

21 Shifting communication skills stations online provided some affordances. First,
22 recruitment of a more diverse patient population and, second, the inclusion of exam
23 questions assessing remote consulting. In respect of the first of these, using virtual
24 conferencing technologies allowed patient partners/ to dial in from many different
25 locations, including overseas (“*some of them were coming in from abroad*”
26 [Participant 6]), decreasing the inconvenience of attending in person for patient
27 partners and increasing the number of patients meeting station demographic
28 requirements. This contrasted with “normal” OSCEs, where the assessment team
29 often struggled to recruit diverse patient partners, particularly in terms of age
30 diversity.

1 Remote patients necessitated dependence on technology which then in turn
2 changed how space was used in the building. Rather than several face-to-face
3 communication skills stations taking place concurrently in a large room divided by
4 screens, each video conferencing station required an individual room. This was due
5 not only to social distancing regulations which limited the number of people in a
6 space, but also because infection control rules disallowed the use of headphones.
7 Sound had to be transmitted by a speaker. The difference in the use of space
8 between a “normal” OSCE and the OSCE held during Covid-19 is illustrated in
9 Figure 1.

10 **.... Figure 1 about here**

11

12 Furthermore, remote stations changed the nature of the student-patient interaction.
13 The rooms in which stations were located were not originally designed for video
14 conferencing and room fixtures and fittings often limited how the equipment for
15 remote consultations could be set up. For example, students could only see the
16 patient’s face projected onto a wall or TV screen, resulting in a disembodied ‘talking
17 head’. The relationship between the location of the camera and the projection of the
18 patient’s face also caused issues for students – looking at the camera so the patient
19 could see them directly sometimes meant not being able to face the patient’s image:

20 *“It’s all to do with position of the camera and sometimes that can lead*
21 *difficulties if the camera is looking... one way and the student is trying to*
22 *communicate with the patient and trying to do visual cues but actually, the*
23 *patients are on the big screen, but the camera is to the left or to the right.”*

24 [Participant 3; see also Photograph 1]

25

26 **..... Photograph 1 about here ...**

27

28 The physical examination stations remained face-to-face but patient partners were
29 replaced by props such as models of body parts or mannequins. This changed the
30 nature of the experience for students:

1 *“The students were completely thrown by it, and because it wasn't what they*
2 *expected and it's very difficult to examine an artificial limb that doesn't move*
3 *and explain things to a limb as opposed to explaining to a person what you*
4 *want them to do so I think they just find that quite difficult. ... doing that whole*
5 *simulation as if it's a patient, I think they kind of struggled with that as an*
6 *overall concept.” [Participant 2]*

7 The shift to models also changed the nature of what was assessed. In the traditional
8 version of the station marks were awarded for assessing the patient's joint
9 movement. The models that were used did not have movable joints, so workarounds
10 had to be made to the marking scheme and examiner instructions:

11 *“When they come to assess movements ask them to describe which*
12 *movements they are assessing and demonstrate movements using their own*
13 *ankles (if possible or the examiners ankles if unable to perform themselves).”*
14 *(Document, Examiner instructions)*

15 On the other hand, replacing patients with models offered some affordances. The
16 use of models enabled the introduction of stations assessing clinical skills which
17 could not be demonstrated on patient partners (e.g., thoracic examination performed
18 on a mannequin and an acute care resuscitation-based station). Although this
19 reordering occurred through necessity, it changed ways of thinking for future OSCEs:

20 *“It caused me to think more about non-human equipment going forward. So,*
21 *would I use that model again? Probably not, but will I use other models going*
22 *forward? Definitely.” [Participant 2]*

23 Technology also enabled social interaction across dispersed sites which, in turn,
24 afforded gains in terms of standardization. Site coordinators used their smartphone
25 cameras to discuss and visually compare how things were set up in mannequin-
26 based stations and thus ensure consistency across sites. For example, Photograph
27 2 shows a station with a mannequin on a hospital bed. In the foreground of the
28 image there is a human hand holding a phone. On the screen of the phone is a live
29 image of a second mannequin in a different OSCE site:

1 *“So this is obviously on the phone to [OSCE location in another city] and then*
2 *us looking at their mannequin while they look at ours to make sure that we've*
3 *got everything set up set up the same” [Participant 3].*

4 **..... Photograph 2 about here ...**

5
6 In summary, the pandemic required reordering of exam spaces to facilitate virtual
7 consultations substituting technologies for human bodies. Virtual consultations
8 required creation and ordering of patients in physical spaces (their own homes)
9 within virtual spaces (Blackboard- virtual learning environment software) within
10 physical spaces (classrooms) for the purpose of assessment. These re-orderings
11 changed the nature of the OSCE process, limiting some activities but exposing new
12 ways of working.

13
14 **Change 2: Flow through space: Architectural affordances and one-way traffic**

15 Students flow through OSCEs, guided from station to station by bells, alarms,
16 whistles and staff - indeed an *“OSCE is like herding sheep”*. (Participant 3) During
17 Covid-19 the basic principles of “OSCE choreography” remained but their precise
18 nature changed because of the need to maintain social distancing. Human traffic
19 through the spaces in the building had to be one way and socially distanced,
20 controlled by rules, safe distancing notices, tape on floors to indicate distances
21 between humans, maximum room occupancy rules and so on (see Photograph 3).

22
23 **..... Photograph 3 about here ...**

24
25 Student cohorts (i.e., the size of a group of students flowing through one OSCE run
26 at the same time) were smaller because of restrictions on the number of people
27 allowed in any one space at any one time and students were separated spatially
28 within their cohorts because of safe distancing regulations:

29 *“The actual setting up of the chairs [as a holding area in readiness for*
30 *candidates starting their assessment] was actually really important. Because it*

1 *kept everybody together and [we] knew where everybody was. It took a lot to*
2 *get our heads around how we're going to do this.” (Participant 3)*

3 Although there were fewer students per cohort and fewer OSCE stations, the same
4 number of OSCE organisers were required to ensure adherence to pandemic
5 regulations and to monitor the flow of students. However, instead of the organized
6 chaos of a typical OSCE, the pandemic OSCE was viewed by staff as easier to
7 control because of fewer stations and less human and material density of stations
8 within rooms. Staff also discussed how the need for individual rooms for each station
9 (because of social distancing regulations) had the benefit of ensuring candidates did
10 not overhear other candidates or patient partners in adjoining stations.

11 *“They [examiners] [previously] found not being able to hear a student was*
12 *difficult because the student next door was maybe extremely loud or the*
13 *patient partner was extremely loud and therefore it just put off that student*
14 *or the examiner maybe didn't actually pick up things because they didn't*
15 *actually hear it and so having everything in single rooms cut down in that*
16 *whole variability.” (Participant 3)*

17 Individual rooms also enabled the inclusion of potentially noisy stations, such as
18 acute care stations involving defibrillators.

19 In summary, the pandemic required reordering of both the exam format and the
20 number of bodies occupying spaces at any one time. The architecture offered the
21 organisers both affordances during the pandemic in that it was easier to control
22 movement of candidates through space, however also limitations, the same numbers
23 of facilitators were required to move students through the one-way system and
24 stations as during a non-pandemic OSCE.

25

26 **Change 3: Barriers to flow: Time and technology**

27 OSCE assessment always requires strict ordering in terms of time (e.g., time before
28 the examination commences to prepare and manage all participants [students,
29 examiners and patient partners], time for stations, time between stations) – and
30 space (e.g., all those participating in the OSCE having to be in the right place at the
31 right time). The medical school had much experience of running traditional OSCE

1 examinations. The usual process was tried and tested and ran smoothly most of the
2 time.

3 *“A lot of thought goes into it, and we try and make the best of it in what we*
4 *can with them at stations and sites” (Participant 5)*

5 *“[The OSCE is like...] A bad theme park! There is a lot of queueing. There's a*
6 *lot of wanting to be in specific places at specific times. I'm trying to get people*
7 *to those places at those times.” (Participant 4)*

8 However, during Covid-19 the well-oiled OSCE machine was no longer fit for
9 purpose. Timings had to change because of group size restrictions, the need to
10 disinfect stations between candidates and to provide extra time in case of
11 technological issues: *“[Moving to video conferencing] posed logistical challenges so*
12 *we built in extra time during the OSCE itself” (Participant 2)*. The combination of
13 social distancing rules and the increased time required to prepare stations meant the
14 OSCE examination process required more time overall. While pre-Covid stations
15 lasted 8-minutes with 90 seconds between stations for reading time, the pandemic
16 OSCE required an additional 30 seconds in the time between stations for cleaning
17 equipment and surfaces. There were also empty spaces built into runs in case
18 students were required to be reinserted mid-run. The consequence of this new
19 ordering was that instead of 200 students passing through 12 face-to-face OSCE
20 stations over a two-day period, two days were required for the same number of
21 students to pass through six face-to-face stations.

22 The use of technology also impacted on timings, with those coordinating the OSCE
23 setting aside more time to check and confirm proceedings with patient partners who
24 were contributing remotely. This necessitated even more use of technology. For
25 example,

26 *“One of the girls [a female patient partner] got confused. ... she thought in the*
27 *afternoon that the start time was the start of the exam and hadn't gone into*
28 *the briefing ahead of time. So, when I was trying to phone her, she'd gone to*
29 *the loo, was making herself a cup of tea, etc.” (Participant 6)*

30 Remote contributions also necessitated extra time in advance of the actual OSCE, to
31 check systems and connectivity and give instructions to examiners and patient

1 partners not just about the content of a station and the marking schemes but also
2 how to log on, what to do if the connection dropped, etc. This additional preparation
3 and the need to adjust internal systems to ensure the flow of the OSCE brought new
4 human players into the OSCE who would not normally be involved:

5 *“So normally our university machines [computers] time out after an hour. So,*
6 *we had to have IT come and turn off all the timeouts on the televisions and*
7 *the AV equipment.” (Participant 6)*

8 In summary timings had to be reordered to accommodate new technologies being
9 used in the assessment (Video conferencing facilities). Participants discussed
10 planning and adjusting for both expected and planned additional components of
11 running the exam during the pandemic (personal and protective equipment, cleaning
12 of equipment, etc.) but also planned a resilient assessment should there be expected
13 but unplanned additional timings required such as IT difficulties with the use of video
14 conferencing technology.

15

16 **Discussion**

17

18 **Main findings**

19 Focusing on how we ran an OSCE during Covid-19 helped us reconsider the
20 essential processes of the OSCE during non-pandemic (“ordinary”) times. This in
21 turn opened up the space to think critically about the processes involved in an OSCE
22 and how they can be changed or not.

23 The overarching requirement of having a “pandemic safe” OSCE led to a reordering
24 of normal, expected processes. Rather than on efficiency, the focus was on allowing
25 a safe flow of human and non-human actors through the assessment spaces. Each
26 change led to additional effects in this complex activity. Human bodies were
27 substituted by various technologies (mannequins and videoconferencing) leading to
28 senses of disembodiment and dehumanization of patients but a feasible and
29 deliverable assessment process. The architecture of our spaces offered affordances
30 and limitations as movement patterns of both human and non-human actors
31 changed through our assessment spaces. There were new barriers to flow to

1 consider, both in the social world (time for candidates to move and complete new
2 tasks such as cleaning and donning PPE) and the material world (complications of
3 introducing technology into the assessment process). Patient partners, candidates,
4 examiners and organisers alike experienced a variety of affordances as well as
5 challenges when technology was embraced to allow the safe function of the OSCE.
6 It was clear that materials do matter in an OSCE.

7

8 **Comparison with previous literature**

9 Over the last few decades there has been increased focus within the social sciences
10 on how people, spaces and things are arranged to allow everyday practices, such as
11 an OSCE, to be accomplished.(43,44) This is also true in the medical education
12 community.(14) In response to this, our sociomaterial investigation provides a
13 powerful example of the complexity of OSCE, deliberately attending to the taken-for-
14 granted material facets of this form of assessment. (9–11,30,33,44)

15 Modes of ordering have been studied in other sociomaterial systems.(25,39,45) In
16 Law's original ethnographic work, for example, he described the ordering processes
17 required to allow a laboratory to function effectively; the policies, procedures,
18 architecture and social relations all interacting and entwined with each being affected
19 by the other.(25) Similarly, through the telling of this OSCE story we can clearly see
20 that each change made has knock on effects to each other actor within the
21 assemblage, sometimes for the better (e.g., allowing younger patient partners to
22 attend via video conferencing from out with the city where the exam was occurring),
23 sometimes for worse (model of joint resulting in a disembodied, dehumanized
24 examination) with both meeting the overarching ordering of providing a "safe OSCE".

25 What constitutes a safe OSCE in the ongoing pandemic era? The notion of safety, in
26 and of itself, is complex, and includes both social and material elements. Obviously,
27 following local best practices designed to slow the spread of Covid-19 was the
28 primary concern, however, there were also other elements of safety to consider,
29 including respecting privacy of participants, and managing the high stakes nature of
30 the assessment, and its associated performative pressures. For example, in our
31 experience most stations involving an examiners and patient were conducted via
32 video conferencing. This practice led to, what both Cleland and MacLeod describe

1 as “uncurated exposure” whereby the viewers (students and examiners) gained
2 exposure to the personal realms of the patients own environments.(46,47) This adds
3 another dimension into the OSCE. For example, did the history being portrayed
4 match what the student was seeing in the background of these video conferences?
5 As MacLeod and colleagues state, “notions of privacy and control are reshaped”, by
6 this when the OSCE was reconfigured online.(47)

7 The OSCE is simultaneously intended to serve as a proxy for an authentic clinical
8 encounter and at the same time not an authentic clinical encounter. The people,
9 spaces, timings and things of the OSCE are ordered for the purposes of
10 assessment, not clinical practice. Hodges describes the highly choreographed
11 aspects of the OSCE with “the movements of participants timed and sequenced. An
12 examination, yes, but it was also a performance.(48) Gormley et al. take this further,
13 examining the “show” of the OSCE.(17) This aligns with our understanding of the
14 actors at play within the orderings of the OSCE so that “the [assessment] show must
15 go on”.(17)

16 **Implications for practice and future research**

17 Whilst Covid-19 acted as a magnifier within our studies, our findings are clearly
18 transferable to other situations. Within medical education there are lots of “known”
19 disruptions, such as increased student numbers and changing government/regulator
20 policies and expectations. There will also be other, “unknown” future disruptions. By
21 looking at OSCEs through a sociomaterial lens we open the possibility of considering
22 alternative ways of doing them in the future. In other words, whilst unique in context,
23 as is much of qualitative investigation, this study has generated transferrable
24 knowledge and highlighted questions healthcare educators need to ask in the
25 future.(49) We cannot predict the next disrupting event that will require social and
26 material reordering and thus cannot foresee the influences of these re-orderings on
27 OSCE-related phenomena such as candidate performance (50), OSCE costs (51),
28 use of patients and technology, etc. However, what we can say is that those
29 managing OSCEs in future disruptions carefully consider how each change or
30 decision, each new configuration of either social and material aspects of an OSCE,
31 changes things and has “knock on” effects, potentially positive or negative, within the
32 network of an OSCE.

33

1 **Strengths and limitations**

2 A clear strength of this study is that it is a theoretically grounded, empirical, case-
3 study. Law's modes of ordering orientated us to consider the processes through
4 which the OSCE is organised, as well as the materials, relationships and activities
5 through which this ordering takes place.(25) Further strengths include hearing under-
6 represented voices in the OSCE discourse; that is, OSCE organisers rather than
7 candidates or examiners.(37) This lens and these voices allowed us to understand
8 more of the sociomaterial complexities in play during an OSCE and highlighted the
9 restrictions and affordances of the places and props within the OSCE. Whilst we
10 consider hearing the under-represented voices a strength within our study, we also
11 acknowledge that the views of patient partners, examiners and students themselves
12 as to the restrictions and affordances of things like video-linking from home (patients)
13 and not mixing with each other (examiners and students) could have provided further
14 richness to our data. We are also aware that in this study we have a researcher as
15 participant. The participant researcher's values may have influenced data collection
16 and interpretation so we mitigated this by taking care in the positionality of the whole
17 team and encouraging full and open team discussions around data collection and
18 analysis.

19 Whilst there are increasing examples in the literature of sociomaterial studies within
20 other areas of medical education (e.g., simulation-based learning(52), distributed
21 medical education (37)), we are aware of only one earlier OSCE study using this
22 lens.(50) Addressing methodological shortcomings in this earlier study, we took care
23 to use a montage of data collection methods to provide multiple perspectives.
24 Moreover, we had the unique opportunity to use a major disruption, a worldwide
25 pandemic, to bring to light the complex orderings and reorderings that are constantly
26 happening in the sociomaterial world of OSCE assessment.

27 Finally, by conceptualizing the OSCE as a living set of socially (human) and
28 materially (nonhuman) enacted processes, we propose that the OSCE can be
29 considered as a verb. In other words, an institution actively "OSCEs". Doing so
30 changes the social perception of the OSCE, and highlights that an OSCE has
31 agency on people, places and things.(13,53)

32

1 **Conclusion**

2 Viewing a pandemic OSCE through a sociomaterial lens illuminated the complex
3 orderings required to deliver a safe, competency-based assessment. Considering
4 the OSCE as a living set of socially (human) and materially (nonhuman) enacted
5 processes changed the social perception of the OSCE and highlighted that an OSCE
6 has agency on people, places and things. In short, the sociomaterial orderings
7 within an OSCE influence the what, when where and how of assessment. Those
8 managing OSCEs must carefully consider how each change or decision, each new
9 configuration of either social and material aspects of an OSCE, changes things,
10 positively or negatively, within the network of an OSCE.

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1 **Declarations**

2 **Ethics approval and consent to participate**

3 Ethical permission for this study was granted by the College Ethics Review Board of
4 the College of Life Sciences and Medicine, University of Aberdeen
5 (CERB/2021/7/2136).

6 **Availability of data and materials**

7 The data is available upon reasonable request by contacting the corresponding
8 author.

9 **Competing interests**

10 The authors declare that they have no competing interests.

11 **Funding**

12 Not applicable.

13 **Authors' contributions**

14 The idea for this study came from CB and evolved through discussions involving all
15 four authors. All authors contributed to developing the protocol and documents for
16 ethics review. CB and LH collected the data and the initial data analysis. JC and
17 AM oversaw the analysis. CB prepared the first draft of the paper which was
18 extensively reworked by JC and AM. All authors contributed preparing the final
19 manuscript. All authors read and approved the final manuscript for submission.

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1 **Presentations**

2 An early version of this study was presented in the Research Stream of the
3 Association for Medical Education in Europe Annual Conference, Lyon, France,
4 August 2022.

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17 **Box 1: Definitions used in OSCEs and the process of a “normal” OSCE**

18 The OSCE is “An assessment tool based on the principles of objectivity and
19 standardisation, in which the candidates move through a series of time-limited
20 stations in a circuit for the purposes of assessment of professional performance in a
21 simulated environment. At each station, candidates are assessed and marked
22 against standardised scoring rubrics by trained assessors”(54) Typically, due to
23 numbers of candidates and numbers of questions, the exam is run simultaneously on
24 different assessment sites (distinct exam locations which may or may not be in the
25 same building or city that contains one whole exam worth of stations) and multiple
26 runs (number of times the exam is held over the course of the assessment period).
27 Each question in an OSCE is referred to as a station. In each station there is usually
28 an actor/patient, candidate, and an examiner. The examiner marks the student
29 according to a checklist and a global score. Candidates are instructed to perform a
30 time-limited task such as taking a clinical history, examining a particular body area,
31 or communicating a management plan with the patient. A bell or alarm sounds at the
32 end of the station and the candidate moves on to the next station in the circuit to
33 complete a different task. Each station is mapped against a curricular blueprint to
34 ensure a variety of elements are being assessed. Movement around the circuit is
35 conducted by site-coordinators who move the students from station to station, keep
36 time and organize examiners to be in the correct station on the correct site at the
37 correct time.

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1 **Figure 1: Floor plan of the 2019 (pre-pandemic) and the 2021 (during the**
2 **pandemic) OSCEs.** The space usually held five sites (areas where OSCE is run
3 simultaneously) and 30 stations. The combination of social distancing and other
4 regulations and the use of technology during the pandemic meant the same space
5 could only hold two sites and a total of 12 stations.



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10 **Photograph 1: A remote communication skills OSCE station.** The patient's head
11 is projected onto wall directly in front of the student's chair. In this station, the
12 webcam is balanced on top of plastic box in middle of station, facing the student.



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1 **Photograph 2: Using technology to compare and standardize station set-up**
2 **across sites.**



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Photograph 3: A corridor showing physical distancing (tape) and one-way (sticker) rules.



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