Comparing medical student experience of face-to-face and remote access consultations during the coronavirus pandemic

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Abstract

Introduction: As a result of the coronavirus pandemic, outpatient consultations in National Health Service Lanarkshire were conducted using various forms of teleconsultation. A qualitative study was undertaken to ascertain how senior medical students valued the experience of outpatient teleconsultations in comparison to face-to-face consultations during the pandemic.

Methods: Anonymised, voluntary surveys were emailed to all medical students who attended clinical placements in specialties utilising teleconsultations. Participants were asked to compare their experience of and perceived value of virtual consultants to face-to-face consultations. Thematic and statistical analysis was performed on the collected data.

Results: Participants unanimously agreed face-to-face consultations enabled learning, with 71.4% (n = 7) having similar experiences in video consultations if a senior was physically present beside them. Video consultation, when the senior clinician was also present virtually, was deemed useful to a lesser extent (66.7%, n = 6). Only half (57.1%, n = 14) valued the learning from telephone consultations. Qualitative analysis revealed that although face to face was the preferred consultation style, there was useful learning gained in all modalities. Students appreciated discussion with senior clinicians to facilitate learning and valued involvement in the consultation through history taking, especially in teleconsultations.

Discussion: Teleconsultation was an effective learning tool for medical students during the coronavirus pandemic, which preserved student exposure to patients during lockdown. This study is optimistic that widespread incorporation of teleconsultation, in all modality, has the ability to support students’ clinical exposure and learning, which is becoming increasingly limited as medical student numbers continue to rise and with the ongoing effects of the pandemic.

Keywords

Remote consultation, medical students, coronavirus, outpatients, COVID-19, pandemic, telehealth

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Introduction

Coronavirus (COVID-19) has altered many aspects of healthcare services, the implications of which continue to be widely discussed and analysed. Healthcare students have had to adjust to the ‘new normal’ of the National Health Service (NHS) and access learning opportunities through ever-changing restrictions. The delivery of clinical placements for medical students is unrecognisable compared to pre-pandemic, with increased use of virtual platforms to deliver teaching and decreased clinical time for students because of social distancing and risk-reducing measures.¹ This study investigates and evaluates the experience of senior medical students’ attendances at outpatient teleconsultation clinics in comparison to face-to-face clinics across three district general sites.

Background

In the UK, teleconsultations have been used in acute inpatient services for some time,² but less so in the outpatient setting.³ Worldwide, access to and use of telemedicine is variable.⁴ Similarly, the inclusion of telehealth in undergraduate and postgraduate curricula varies across medical schools worldwide.⁵,⁶

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COVID-19 has accelerated the NHS towards technological advancement under unprecedented pressure and desperate need to ensure ongoing health needs are met, while maintaining risk-reducing measures. In response to the UK-wide lockdown, general practitioners rapidly transitioned towards predominantly virtual assessments, with secondary care following suit after a period of substantial inactivity. Telephone clinics, video assessments and combinations of technology-supported medical reviews have become the norm, but the impact of this rapid and unplanned transition with regards to medical education is yet to be fully understood.

In the Spring of 2020, undergraduate clinical placements across the UK were cancelled. Much of the medical education literature to date has focussed on the move from the clinical teaching environment to virtual tutorials. However, as students returned to the clinical environment, centres involved students in telehealth activities, including shadowing virtual clinics, virtual ward rounds and leading virtual clinics under senior supervision. Other centres introduced educational interventions to teach undergraduates key concepts of teleconsultation. Outpatient clinics have long been believed to offer a valuable learning experience for medical students, providing opportunities to observe clinical encounters and develop clinical skills and acumen. This learning may be scaffolded by the clinician leading the consultation, though experiences are reported to be variable and may depend on the enthusiasm of both the medical student and the supervising clinician, much like any experiential learning. Despite the recent widespread adoption of telemedicine into undergraduate clinical placements, the evidence of its learning benefit is only beginning to emerge. It is hoped, however, that the learning value would mirror that of traditional outpatient clinics. Reflective articles highlight the benefits of teleconsultations including the ability to discuss the patient’s care in a ‘patient-free zone’ and the ability to see more patients in a shorter time frame. Also mentioned is the ability to develop verbal communication skills, clinical reasoning and professionalism. Additionally, there is a noted lack of training in how to use these platforms safely and lawfully.

There remains a lack of evidence of how the learning experience of teleconsultations compares with that of traditional face-to-face consultations. This study aims to compare the experiences of senior medical students attending outpatient teleconsultations to face-to-face clinics, while also exploring the perceived influencing factors to positive and negative experiences.

**Methods**

**Study design**

A survey was designed to investigate students’ experience of face-to-face consultations and teleconsultations during their specialty placement, to ascertain whether attendance at teleconsultation should be a regular activity on student timetables. The survey contained both Likert scale questions as well as free-text responses and a mixed-methods approach was employed to analyse the results.

**Participants and setting**

Voluntary, anonymised online questionnaires were emailed retrospectively to all fourth, fifth and sixth-year medical students who had completed a clinical placement in the local trust, in specialties that were utilising virtual clinics (paediatrics, obstetrics and gynaecology and musculoskeletal). All students attended clinical placements between August 2020 and March 2021. Video consultations were conducted via the NHS-approved Nearme/Attend Anywhere software. The University and local trust codes of conduct for accessing virtual assessments were outlined to the students at their induction, which students were expected to strictly adhere to, to maintain confidentiality and patient safety.

Completion of, or lack of participation in the survey, was anonymous and had no impact on academic progression. This was clearly highlighted in the introduction to the survey.

**Data collection**

The questionnaire was designed by the study authors. Non-identifiable demographic data was collected including year group, medical school and specialty attended. Experiences of clinics in all formats were requested (face-to-face clinic, video consultations when accessed in the same room as a senior clinician, video consultations when accessed in a different location to the senior (e.g. at home) and telephone consultations). Students were asked regarding their overall satisfaction with the opportunity to attend clinics during their placement and to approximate the numbers of clinics attended and patients seen. The learning experiences were also enquired about; if each style of consultation enabled learning and what the students had learnt as a result. Factors promoting learning including engagement with the senior clinician and inhibitory factors including Information Technology (IT) difficulties were requested. The survey was modified for a second round of data collection to eliminate the positive bias of question wording and increase the volume of qualitative data captured.

This paper describes the results of the evaluative feedback and follows the principles of the declaration of Helsinki; therefore, ethical approval was not sought.

**Data analysis**

Likert scale and yes/no responses were analysed by calculating descriptive rates and converted to numerical values where required to interpret using the Kruskal–Wallis $H$ test.
Table 1. Attendance at each style of consultation, involvement of senior clinician and Information Technology (IT) difficulties.

| Consultation style | Face to face | Video with senior | Video separate with senior | Telephone |
|--------------------|--------------|-------------------|---------------------------|-----------|
| Overall            | 89.0% (n = 46) | 21.7% (n = 46)    | 15.2% (n = 46)             | 45.7% (n = 46) |
| Paediatrics        | 80.0% (n = 20) | 35.0% (n = 20)    | 35.0% (n = 20)             | 15.0% (n = 20) |
| Obstetrics and gynaecology | 100% (n = 11) | 0% (n = 11)       | 0% (n = 11)                | 72.7% (n = 11) |
| Musculoskeletal    | 93.0% (n = 15) | 20.0% (n = 15)    | 0% (n = 15)                | 66.7% (n = 15) |

| Mean number of patients seen |
|------------------------------|
| Overall                      | 13.6 (n = 41) | 6.2 (n = 10) | 5.3 (n = 7) | 6.7 (n = 21) |
| Paediatrics                  | 5.3 (n = 16)  | 4.6 (n = 7)  | 5.3 (n = 7) | 3.7 (n = 3)  |
| Obstetrics and gynaecology   | 15.5 (n = 11) | N/A           | N/A          | 6.9 (n = 8)  |
| Musculoskeletal              | 20.9 (n = 14) | 10.0 (n = 3)  | N/A          | 7.4 (n = 10) |

| Did the senior consultant explain the background/management of the patient? Answer = yes |
|-------------------------------|
| Overall                       | 100% (n = 41) | 100% (n = 10) | 57.1% (n = 7) | 90.5% (n = 21) |
| Paediatrics                   | 100% (n = 16) | 100% (n = 7)  | 57.1% (n = 7) | 100% (n = 3)  |
| Obstetrics and gynaecology    | 100% (n = 11) | N/A           | N/A          | 87.5% (n = 8) |
| Musculoskeletal               | 100% (n = 14) | 100% (n = 3)  | N/A          | 90.0% (n = 10) |

| Did the student have the opportunity to ask questions? Answer = yes |
|-----------------|
| Overall         | 97.6% (n = 41) | 100% (n = 10) | 71.4% (n = 7) | 81.0% (n = 21) |
| Paediatrics     | 95.0% (n = 16) | 100% (n = 7)  | 71.4% (n = 7) | 100% (n = 3)  |
| Obstetrics and gynaecology | 100% (n = 11) | N/A          | N/A          | 75.0% (n = 8) |
| Musculoskeletal | 100% (n = 14) | 100% (n = 3)  | N/A          | 80.0% (n = 10) |

| Were there any significant IT malfunctions that impaired the consultation? |
|-----------------------------|
| Overall                     | No 82.9% (n = 41) | No 60.0% (n = 10) | No 57.4% (n = 7) | No 81.0% (n = 21) |
| Paediatrics                 | No 68.7% (n = 16) | No 57.1% (n = 7)  | No 57.4%         | No 66.7% (n = 3)  |
| Obstetrics and gynaecology  | No 90.9% (n = 11) | N/A              | N/A              | No 87.5% (n = 8)  |
| Musculoskeletal             | No 78.6% (n = 14) | No 100% (n = 3)  | N/A              | No 80% (n = 10)   |

Table 1 demonstrates the attendance at each style of consultation as well as factors promoting and inhibiting learning. 89.0% (n = 41) of students attended face-to-face consultations, 21.7% (n = 10) attended a video consultation with a senior in the same room, 15.2% (n = 7) attended a video consultation in a separate location to the senior clinician and 45.7% (n = 21) of students attended telephone consultations. There was a statistically significant difference in the number of telephone consultations attended between the different specialties, with less students in paediatrics attending telephone consultations when compared to students in obstetrics and gynaecology and musculoskeletal medicine. This difference was not statistically significant when Kruskal–Wallis test is applied (H statistic 16.4718, n = 46).

Results

The response rate was 41.8% (n = 46), 43.5% (n = 20) of the students attended paediatrics, 23.9% (n = 11) obstetrics and gynaecology and 32.6% (n = 15) musculoskeletal departments. Students attended one to three clinics in paediatrics, four to six in obstetrics and gynaecology and >6 in musculoskeletal medicine. This difference was not statistically significant when Kruskal–Wallis test is applied (H statistic 16.4718, n = 46).

Free-text responses were analysed through a qualitative thematic analysis, which was performed independently by two authors. An inductive approach was utilised to derive themes and was approached with a constructivist epistemology. The authors then discussed and agreed upon the overarching and subthemes.25

N = population size.

n = sample size.
present (H statistic 2.5723, n = 46), or video consultations distanced to a senior clinician (H statistic is 4.066, n = 46).

73.4% (n = 34) of students were satisfied or highly satisfied with the ability to attend clinics during the placement. There was no statistically significant difference in satisfaction between the specialties (H statistic 4.6841, n = 46).

An appropriate number of patients were seen in each modality of consultation and there was no statistically significant difference in the number of patients seen between each style of consultation (H statistic 6.6429, n = 80). There was a statistically significant difference in the number of patients seen in face-to-face clinics in each specialty, with less students being seen in paediatrics compared to obstetrics and gynaecology and musculoskeletal (H statistic 13.7437, n = 42, p = 0.00104).

On most occasions, students reported that senior clinicians explained the relevant clinical history and students had the opportunity to ask questions. This was most likely to happen in face-to-face clinics and least likely in video consultations accessed distanced to a senior clinician; the differences were not statistically significant (H statistic 2.9718, n = 80 and H statistic 2.0629, n = 83, respectively.)

IT difficulties were encountered in all specialties and types of consultation; there was no statistically significant variation between the different styles of consultation (H statistic 1.6415, n = 81).

Table 2 demonstrates the students’ perceived learning experience of each style of consultation. 100% (n = 19, survey version 1) of students across all specialties found that attending the clinic enabled them to meet learning outcomes for the specialty and 100% of students agreed or strongly agreed that their experience of each type of consultation was useful to add to their learning (n = 19, survey version 1). There was no statistically significant difference in the reported degree of usefulness for learning face-to-face consultations versus teleconsultations (H 0.0242, n = 26, p = 0.87627). In version 2 of the survey, students were asked if each clinic style enabled learning, to which 100.0% (n = 19, survey version 1) of students in face-to-face consultations, 71.4% (n = 7) of students in video consultations in the same room as the senior clinician, 66.7% (n = 6) of students in video consultations distanced from the senior clinician and 57.1% (n = 14) of students in telephone consultations agreed. This difference was not statistically significant (H statistic 5.7662, n = 54). It appears face-to-face consultations were seen as the preferred consultation style; however, most students found attendance at video consultations and telephone consultations a useful learning experience.

**Thematic analysis**

Themes arising from the survey responses are outlined in Table 3.

**Face-to-face consultation**

**Experience.** All students made positive comments about their experience of face-to-face consultations, describing benefits including the ability to practice examinations, see clinical signs, acquire knowledge of different conditions and practice communication skills. Three students noted the benefits of being physically present in the consultation ‘reinforced learned information better because you got to see the presentations face-to-face’. Being face-to-face was more likely to facilitate discussion ‘any conditions seen were discussed after each patient’. One student noted that outpatient consultations offered unique clinical exposure that would not have been gained elsewhere ‘saw procedures which I would not [have] seen usually’.

**Logistical challenges.** Despite being face to face, IT malfunctions including slow internet connection, slow computers and software crashes delayed teams from viewing patient notes and imaging.

**Video consultation**

**Experience.** Video consultations were preferred secondary only to face to face. Mixed experiences were noted: three students described plentiful learning, including the presentation and management of specific conditions while two students reported video consultations were ‘more difficult to gain anything as there was no possibility of examining the patient’. Three noted that clinician involvement was key to enable learning: ‘as long as [the senior clinicians] talk to us and give us information … it is useful’. Another noted video consultations were ‘useful in the same room as you can discuss in-between patients but less useful if [you are] both remotely online’.

**Logistical challenges.** Poor Wi-Fi connection, slow computers and defective microphones caused issues. Two students mentioned unexpected benefits to video consultations: ‘it’s more convenient and efficient for time’; ‘it is easier to watch from home’.

**Telephone consultation**

**Experience.** Most students valued telephone consults. Four students reported they were ‘great for history taking’; two students saw ‘good examples of communication’. One student recognised a need to learn the skill of telephone consultation, mentioning it was ‘useful to practice for working but not as effective as face-to-face consultations’. Three noted that telephone consults were utilised for different patient groups (return patients or ‘relatively simple’ cases).

Five students failed to find value in telephone consultations, describing them as ‘passive’, ‘not useful’; two...
Table 2. Learning experience of each type of consultation.

| Consultation style                   | Face to face | Video with senior | Video separate with senior | Telephone |
|--------------------------------------|-------------|-------------------|---------------------------|-----------|
| **Survey 1. Did this clinic style meet any of the learning outcomes specific to your specialty block? Answer = Yes** |
| Overall                              | 100.0% (n = 15) | 100.0% (n = 3) | 100.0% (n = 1) | 100.0% (n = 7) |
| Paediatrics                          | 100.0% (n = 6) | 100.0% (n = 3) | 100.0% (n = 1) | 100.0% (n = 1) |
| Obstetrics and gynaecology           | 100.0% (n = 5) | N/A              | N/A              | 100.0% (n = 4) |
| Musculoskeletal                      | 100.0% (n = 4) | N/A              | N/A              | 100.0% (n = 2) |
| **Survey 1. Did this clinic style meet any other parts of the medical curriculum, out with this specialty block? Answer = Yes** |
| Overall                              | 46.7% (n = 15) | 0.0% (n = 3)     | 0.0% (n = 1)     | 14.3% (n = 7)  |
| Paediatrics                          | 66.7% (n = 6) | 0.0% (n = 3)     | 0.0% (n = 1)     | 0.0% (n = 1)   |
| Obstetrics and gynaecology           | 20.0% (n = 5) | N/A              | N/A              | 25.0% (n = 4)  |
| Musculoskeletal                      | 50.0% (n = 4) | N/A              | N/A              | 0.0% (n = 2)   |
| **Survey 1. To what extent do you agree with the following statement: ’My experience of [style of consultation] in this clinical rotation was useful to add to my learning.’** |
| Overall                              | Strongly agree | 40.0% (n = 15) | 66.7% (n = 3) | 100.0% (n = 1) | 14.3% (n = 7) |
| Paediatrics                          | Strongly agree | 40.0% (n = 6)   | 66.7% (n = 3) | 100.0% (n = 1) | 100.0% (n = 1) |
| Obstetrics and gynaecology           | Strongly agree | 40.0% (n = 5)   | N/A             | 0.0% (n = 4)   |
| Musculoskeletal                      | Strongly agree | 50.0% (n = 4)   | N/A             | 0.0% (n = 2)   |
| **Survey 2. Did this clinic style enable learning? Answer = Yes** |
| Overall                              | 100.0% (n = 26) | 71.4% (n = 7) | 66.7% (n = 6) | 57.1% (n = 14) |
| Paediatrics                          | 100.0% (n = 10) | 100.0% (n = 4) | 66.7% (n = 6) | 50.0% (n = 2) |
| Obstetrics and gynaecology           | 100.0% (n = 6) | N/A             | N/A             | 50.0% (n = 4) |
| Musculoskeletal                      | 100.0% (n = 10) | 33.3% (n = 3) | N/A             | 62.5% (n = 8) |

students suggested they should be removed from the placement entirely. Reasons included a lack of clinical examination: ‘without seeing patients it is difficult to visualise the clinical problem/condition’ and less discussion between the student and the clinician. Involving the student in history taking made the consultation more useful for learning; however, this did not happen consistently.

Logistical challenges. A lack of speakerphones in multiple outpatient departments was highlighted, which meant students could not hear the patient. Students also described computer problems as previously mentioned. Students suggested ‘would perhaps be useful if we could access telephone-only clinics remotely, to save time and money spent travelling’.

Overall themes

Experience. Unsurprisingly, face-to-face consultation was seen as the optimum learning experience. Experiential learning was important: ‘nothing can replace seeing patients in person and discussing their symptoms, diagnosis and management’. While experiential learning was also present in teleconsultations, two students described teleconsultations as less memorable or engaging than physically meeting patients. Students also noted the need for virtual consultations in an ever-changing and adapting healthcare system: ‘It’s still exposure to patients and it’s likely to stay’.

Most students (n = 17) found face-to-face clinics easily accessible; however, administrative errors with locations and unnotified cancellations impacted. Social distancing restrictions meant that some students were asked to leave as room capacity was already filled.
Confidence building. Attendance at face-to-face clinics improved clinical and professional confidence: ‘the consultants… allowed me to take the histories of all the patients… which hugely boosted my confidence’. Non-technical skills development was also noted: ‘good for building rapport in regards to young children’; ‘how to sensitively approach conversations of traumatic obstetric histories’. Students were more likely to report consolidating non-technical skills in face-to-face consultations; learning in remote consultations seemed to be more focussed on knowledge acquisition.

Clinical competence. Students acquired knowledge of different conditions and management through experiential learning and discussion, allowing them to meet requirements of the undergraduate curriculum. Students were able to practice history taking and examination and learn how to identify clinical signs. There was a desire to be involved in the consultation and there were several suggestions that students should be leading consultation, both in remote access and in face-to-face consultation.

Adaptability and emotions. Perceptions varied with regards to clinic experience, from ‘excellent’ to ‘fine’ and one student reporting ‘very dissatisfied’. Factors influencing perceptions included cancellations, lack of involvement or lack of clinical examination. While some students appeared to make the most of what was offered, other students appeared unable to glean any useful learning from virtual consultations. Overall, students reported staff to be ‘welcoming’ and ‘keen to teach’ and appreciated the effort that had been taken to enable the students to attend clinics.

Interestingly, the COVID-19 pandemic was only mentioned once: ‘good to see… clinics can still go on in the middle of a pandemic’.

Discussion
Value of face to face and teleconsultation
This evaluative project suggests that attendance at any modality of outpatient clinic offered a valuable learning experience and maintained medical student exposure to ‘real’ patients at a time in which face-to-face experience with patients was limited. This information is essential as we continue in recurring waves of the pandemic, knowing that students are still meeting their educational needs and are adapting to acquiring knowledge and skills through new means.

Interestingly, despite varying exposure to each clinic modality across specialties, the learning experiences were not identified as being significantly different, suggesting that exposure to a combination of clinic styles, in any proportion, can still offer positive outcomes. While students preferred face-to-face consultation, telemedicine offered a great learning opportunity, albeit less consistently when compared to face-to-face consultation. Video consultations permitted the acquisition of clinical knowledge; telephone consultations gave the opportunity to observe the differences of communication over the telephone; and in some cases practice this.

Notably, acquisition of non-technical skills was not mentioned in video consultations like in the other styles of consultation. This feedback suggests that the type of
learning gained may vary depending on the style of consultation. Clinicians should be considerate of these findings, both when facilitating learning in outpatient consultations and also when planning undergraduate placements to ensure learners have a balanced exposure to meet learning needs.

**Beneficial factors for learning**

Involvement of the senior clinician in facilitating learning is critical in all modalities of clinic exposure, arguably more so in the virtual setting. When achieved, this was highly praised as having a positive influence on student learning. The literature in medical education is favourable towards social participation as a feasible learning process. Furthermore, active student participation in history taking or clinical examination should be encouraged by clinicians (where appropriate) as learning is enhanced through concrete experience and promotes fulfilment of students’ learning needs. Faculty development for clinicians is therefore key to progressing the learning that can be achieved by students in the outpatient consultation, both face to face and virtual.

Interestingly, students did not mention the development of clinical reasoning as highlighted previously. Clinical reasoning is both an important skill for doctors to develop and also a method to involve students when it might be inappropriate for them to lead the consultation. Frameworks to teach clinical reasoning include the 1-minute preceptor and SNAPPS.

**Barriers to learning**

IT problems frequently impaired the consultation experience, in all modalities. As the virtual platform becomes more heavily relied on, there remains a need to invest in the IT infrastructure of clinical departments.

Many students did not recognise the importance of the skill of teleconsultation. This may have been exacerbated by a slowed adoption of telemedicine into healthcare systems as well as undergraduate medical education. This lack of momentum should hasten medical schools to ensure learners have a balanced exposure to meet learning needs.

While the majority of students found teleconsultations a useful learning experience, other students did not learn anything from attending similar teleconsultation clinics. We postulated that this may be due to a variation in the ability of students to self-direct learning. The students that did not find virtual consultations useful attributed the senior clinician, technical difficulties or not being face to face as barriers to learning. These students may have required active teaching with clinicians to gain learning benefit, while other students were able to find new information through observation and used this to self-direct learning at a later stage. Although ideally clinicians should offer teaching through active discussion, this is not always possible and it is vital that undergraduate centres prepare and support students to develop into self-directed adult learners as this need persists into postgraduate training. Students should be taught to recognise their learning styles and how to use these to their advantage.

**Strengths and weaknesses of the study**

This evaluative study demonstrates how medical students compared their experience of teleconsultation with face-to-face consultation during the COVID-19 pandemic and details important learning that students were able to gain from each style of consultation.

Students were recruited from three NHS sites and two universities. The study considered a reasonable time period to allow clinicians to adjust to using virtual platforms and spanned varying stages of the pandemic and lockdown restrictions.

However, only three specialties were surveyed; it is unsure if these results would apply to other specialty placements, including medicine, surgery and general practice which constitute a large proportion of the undergraduate curriculum. Some students undertook more than one rotation in NHS Lanarkshire; it is impossible to tell if the same students answered the surveys more than once (but in a different specialty), due to anonymity. Future research should be undertaken into the medical student experience of teleconsultation in other specialties and crucially in primary care as well when no longer learning during a pandemic.

Possible positive bias in the first survey was reduced with the adjustment of the wording from ‘to what extent do you agree with…’ to ‘Did this clinic style enable learning?’

While the online survey software was an accessible means to poll students and resulted in a high response rate, answers were often short which reduced the richness of qualitative results.

As the survey did not poll the clinicians leading the consultation or the patients themselves, it is unclear whether students attending remote consultations is well accepted by either group and is another area that requires further research.

**Conclusion**

This study has demonstrated that although face-to-face consultations were the preferred consultation style for medical students, teleconsultation clinics offered a valuable learning experience and were well accepted by the majority of students. Medical students derived benefits from active involvement in both styles of consultations, including in
history taking and clinical reasoning. It is of benefit that undergraduate placement timetables offer balanced experiences of teleconsultations and face-to-face clinics. Medical students noted the need to learn and develop specific communication skills for consulting in teleconsultations, which highlights a need for telemedicine to be included in undergraduate medical curricula.

In this health board, upgrading of IT systems would further improve student learning in teleconsultation clinics. It is becoming more apparent that both clinical practice and medical education cannot return to previous models, especially with predicted continued increases in medical student numbers.\textsuperscript{33} Medical schools and health boards will need to be strategic and creative to capture all beneficial learning opportunities in secondary care and utilising teleconsultation as a learning opportunity is a possible means of doing so.

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References

1. 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. \textit{Med Teach} 2020; 42: 1202–1215.
2. Hill E, Whitehead M, MacInnes B, et al. The first 100 thrombolyis cases in a novel Scottish mesh telstroke system. \textit{Scott Med J} 2013; 58: 213–216.
3. O’Callahil M, Sivanandan MA, Diver C, et al. The use of patient-facing teleconsultations in the national health service: scoping review. \textit{JMIR Med Inform} 2020; 8: e15380.
4. World Health Organisation. Telemedicine: opportunities and developments in Member States: report on the second global survey of eHealth. Global Observatory for eHealth Series, https://www.who.int/goe/publications/goe_telemedicine_2010. pdf (2009, accessed 23 July 2021).
5. Yaghobian S, Ohanessian R, Iampetro T, et al. Knowledge, attitudes and practices of telemedicine education and training of French medical students and residents. \textit{J Telemed Telecare} 2020; 28: 248–257.
6. Wong CJ, Nath JB, Pincavage AT, et al. Telehealth attitudes, training, and preparedness among first-year internal medicine residents in the COVID-19 era. \textit{Telemed J E Health} 2022; 28: 240–247.
7. Joy M, McGagh D, Jones N, et al. Reorganisation of primary care for older adults during COVID-19: a cross-sectional database study in the UK. \textit{Br J Gen Pract} 2020; 70: e540–e547.
8. Darnton R, Lopez T, Anil M, et al. Medical students consulting from home: a qualitative evaluation of a tool for maintaining student exposure to patients during lockdown. \textit{Med Teach} 2021; 43: 160–167.
9. Chandra S, Laotpeppitaks C, Mingioni N, et al. Zooming-out COVID-19: virtual clinical experiences in an emergency medicine clerkship. \textit{Med Educ} 2020; 54: 1182–1183.
10. Mulvihill C, Cooper J, Pavey J, et al. Remote consultations in primary care during the COVID-19 pandemic: student perspectives. \textit{Postgrad Med J} 2020; 92: e88–e89.
11. Hofmann H, Harding C, Youn J, et al. Virtual bedside teaching rounds with patients with COVID-19. \textit{Med Educ} 2020; 54: 959–960.
12. Abraham HN, Opara IN, Dwayih RL, et al. Engaging third-year medical students on their internal medicine clerkship in telehealth during COVID-19. 2020; 12: e8791.
13. Akama-Garren EH, Shah SA, Zinzuwadia AN, et al. Outcomes of a student-led telemedicine clinic in response to COVID-19. \textit{J Ambul Care Manage} 2021; 44: 197–206.
14. McDaniel LM, Molloy M, Hindman DJ, et al. Phone it in: a medical student primer on telemedicine consultation in pediatrics. \textit{MedEdPORTAL} 2021; 17: 11067.
15. Walker C, Echternacht H and Brophy PD. Model for medical student introductory telemedicine education. \textit{Telemed J E Health} 2019; 25: 717–723.
16. Pchan CM, Anderson CE, Min LC, et al. Geriatric Education on Telehealth (GET) access: a medical student volunteer program to increase access to geriatric telehealth services at the onset of COVID-19. \textit{J Telemed Telecare} 2021: 1357633X211023924. Online ahead of print.
17. Horner P, Hunukumbure D, Fox J, et al. Outpatient learning perspectives at a UK hospital. \textit{Clin Teach} 2020; 17: 680–687.
18. Wood D, Bruner JS and Ross G. The role of tutoring in problem solving. \textit{J Child Psychol Psychiatry} 1976; 17: 89–100.
19. Lave J and Wenger E. \textit{Situated learning: legitimate peripheral participation}. Cambridge: Cambridge University Press, 1991.
20. McAuliffe O, Lami M and Lami T. The impact of virtual fracture clinics on medical education - a medical student perspective. \textit{Med Educ Online} 2016; 21: 30950.
21. Iancu AM, Kemp MT and Alam HB. Unmuting medical students’ education: utilizing telemedicine during the COVID-19 pandemic and beyond. \textit{J Med Internet Res} 2020; 22: e19667.
22. Echelard J, Mèthot F, Nguyen H, et al. Medical student training in eHealth: scoping review. \textit{JMIR Med Educ} 2020; 6: e20027.
23. Edirippulige S, Gong S, Hathurusinghe M, et al. Medical students’ perceptions and expectations regarding digital health education and training: a qualitative study. \textit{J Telemed Telecare} 2020; 28: 258–265.
24. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects, https://www.wma.net/
25. Kiger ME and Varpio M. Thematic analysis of qualitative data: AMEE Guide No. 131. Med Teach 2020; 42: 846–854.
26. Vygotsky LS. Mind in society: the development of higher psychological processes. Cambridge: Harvard University Press, 1978.
27. Kolb DA. Experiential learning: experience as the source of learning and development. Englewood Cliffs: Prentice Hall, 1984.
28. Maslow AH. A theory of human motivation. Psychol Rev 1943; 50: 370–396.
29. Smith AC, Thomas E, Snoswell CL, et al. Telehealth for global emergencies: implications for coronavirus disease 2019 (COVID-19). J Telemed Telecare 2020; 26: 309–313.
30. Edirippulige S, Brooks P, Carati C, et al. It’s important, but not important enough: eHealth as a curriculum priority in medical education in Australia. J Telemed Telecare 2018; 24: 697–702.
31. Waseh S and Dicker AP. Telemedicine training in undergraduate medical education: mixed-methods review. JMIR Med Educ 2019; 5: e12515.
32. Honey P and Mumford A. The manual of learning styles. Maidenhead: Peter Honey Publications, 1982.
33. The Scottish Government. Equality Impact Assessment – Results. Increasing the number of Scotland domiciled/EU students studying medicine at Scottish universities, https://www.gov.scot/publications/increasing-number-scotland-domiciled-eu-students-studying-medicine-scottish-universities/pages/3/ (2019, accessed 23 July 21).