


BMJ Open Teaching undergraduate medical students virtual consultation skills: a mixed-methods interventional before-and-after study

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ABSTRACT

Objectives To evaluate the impact and transferability of a novel teaching method on virtual communication skills for final year medical students.

Design Mixed-methods, interventional before-and-after study.

Setting NHS Lanarkshire, Scotland.

Participants 21 final year medical students on their obstetrics and gynaecology (O&G) placement from September to December 2020.

Interventions A two-part teaching session on virtual communication skills.

Main outcome measures Self-reported confidence in conducting consultations preteaching and post-teaching, exposure to virtual consultations, usefulness of teaching and transferability to primary care. Data were collected using preteaching and post-teaching evaluation tools and an online survey.

Results Of 21 participants, 1 student did not attend the second session so was excluded from post-teaching evaluation results and the online survey. Preteaching results were collected from 21 participants and post-teaching results from 20. Mean confidence scores increased across all domains post-teaching. Mean confidence in opening the consultation increased from 2.67 (95% CI 2.21 to 3.13) to 4.70 (95% CI 4.50 to 4.90); history-taking from 3.38 (95% CI 3.07 to 3.69) to 4.45 (95% CI 4.19 to 4.71); decision-making and forming a management plan from 2.62 (95% CI 2.28 to 2.96) to 3.90 (95% CI 3.66 to 4.14) and closing the consultation from 2.81 (95% CI 2.45 to 3.17) to 4.60 (95% CI 4.38 to 4.81). There was no change in exposure to virtual consultations during O&G placement. 16 (80%) participants responded to the online survey; 14 (87.5%) rated the sessions 'very useful' and all 16 considered them worthwhile continuing. 12 (75%) had the opportunity to practise virtual consultations on general practitioner, mostly via telephone.

Conclusions We found that teaching students virtual consultation skills improved short term confidence and were transferable to primary care placements. Future research is suggested to assess this teaching model following adaptation and incorporation into medical education and training across specialties and grades. It would be useful to evaluate the impact on competence post intervention through observed skills.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ We have developed and evaluated a novel teaching method to keep pace with the increasing use of new technologies within medical education.
- ⇒ Virtual consultation skills taught on a secondary care obstetrics and gynaecology placement were also transferable to primary care, increasing the likelihood that this teaching method could be adapted for other specialties.
- ⇒ A limitation is the small participant number which may reduce reliability and validity of the findings, it would be beneficial to study a larger population in future.
- ⇒ We could not exclude the impact of ongoing clinical placement and increasing knowledge of the specialty on student's confidence in conducting consultations.
- ⇒ One participant did not attend both sessions and was excluded from post-teaching results but could not be excluded from preteaching results due to study anonymity.

INTRODUCTION

In response to the COVID-19 pandemic, there has been a transformation in the format of both primary and secondary care clinics.¹ Specifically, an increase in virtual (or remote) clinics and the use of telemedicine.²⁻⁴ This includes telephone or video consultations alongside online messaging interfaces. This paper will use the term 'virtual' consultations rather than 'remote' or 'telemedicine' but terms may be used interchangeably elsewhere. Virtual clinics are now an important part of the medical professional workload and it appears that this is likely to remain following resolution of the pandemic.⁵

With the integration of these consultation methods into routine practice, clinicians have had to adapt and learn new skills on the job. As outlined in the GMC Good Medical Practice guide to duties of a doctor, it is important that medical students and clinicians are



equipped with up-to-date knowledge and skills to avoid the potential for patient harm.⁶ This includes new technological and communication skills used for telephone or video consultations. Due to different clinical settings and equipment used, successful virtual consultations require a unique skill set alongside generic communication skills to provide safe care and maintain patient confidence.⁷ Telephone and video consultations follow a similar structure, content and duration as well as equal limitations of data protection, confidentiality and technical issues.¹ The main difference between the two is the lack of visual cues over the telephone.^{8,9} This lack of visual feedback for both patient and clinician can limit communication, interpreting emotions and understanding, and excludes physical examination. However, video consultations require greater digital skill and therefore are not always appropriate. In a study comparing students' experiences communicating with a patient face to face, an in-person patient actor or a virtual patient, students reported that the virtual communication was the most challenging.¹⁰ Specific barriers to virtual clinics include: use of technology, ensuring security and confidentiality, demonstrating non-verbal skills, computer or telephone etiquette and physical examination.^{2,7} Consequently, there has been a surge in publications on the practicalities of conducting virtual consultations.^{1,3,11,12} However, these have focused on tips for current trainees and consultants rather than teaching students for future practice. Despite recent literature on postgraduate virtual consultation skills and longstanding research on general undergraduate communication skills,^{7,13,14} we identified a gap in teaching undergraduate medical students specific virtual consultation skills.

In addition to the effect of the pandemic on new consultation technologies, we have also seen a change in teaching technologies among medical educators.^{15,16} Medical student clinical placements and in-person teaching were suspended globally to help reduce spread of the virus.¹⁵⁻¹⁷ Instead, distance learning platforms and online teaching became the norm, enabling continued learning despite restrictions of the pandemic. Interfaces such as Microsoft Teams, YouTube and Zoom have been used for delivering live and prerecorded lectures, small group tutorials and online modules.¹⁶⁻¹⁸ Students have since returned to clinical areas but with virtual clinics and social distancing measures in place they have had a reduction in patient exposure. Consequently, UK medical students have reported concerns regarding clinical competence¹⁶ and reduced preparedness for foundation training.¹⁸ We considered how we could adapt our teaching using these new technologies to increase students' confidence in patient-facing skills in a safe environment without compromising learning.

With the increasing use of virtual clinics and new technologies in both primary and secondary care, we believe it is integral to teach undergraduates these skills. The pandemic has given us a unique opportunity to develop and evaluate creative, new teaching methods using

enhanced technologies. This research aimed to evaluate the effects of a novel teaching session on virtual consultation skills for final year medical students. We have used the obstetrics and gynaecology (O&G) setting but believe that these teaching methods could be replicated across and within specialties.

METHODS

Patient and public involvement statement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Participants

Participants were final year medical students studying at the University of Glasgow (UoG) on their O&G placement at University Hospital Wishaw (UHW). We included all 21 students on O&G placement from September 2020 to December 2020. As part of the UoG medical degree, final year students spend 4 weeks on O&G at UHW in groups of 5 or 6. Participant demographics consisted of 5 male and 16 female students, aged between 22 and 26, including 4 mature students and 1 international student.

All 21 participants attended the initial teaching session; however, 1 student did not attend the second session. Due to study anonymity their preteaching results could not be identified and, therefore, not excluded from the study. Consequently, 21 students made up the initial preteaching results whereas post-teaching results were collected from 20 students.

Study design

We designed a two-part teaching session on virtual consultation skills. Teaching was delivered in weeks two and four of their 4 week O&G placement during students' regular twice weekly tutorials.

Current communication skills curriculum

The UoG outlines its communication skills curriculum within the vocational skills section of the course. In the first 2 years of the degree students have a weekly 3-hour session on communication skills, ethics, hospital and general practitioner (GP) visits, personal and professional development and community health. In third year this is furthered by an 'Introduction to Communication Skills' session and five small group sessions with a tutor. In the final 2 years, communication skills are assessed during the students' GP placements where they receive formal feedback.¹⁹ The current curriculum does not include virtual communication skills.

Initial session

The first session comprised an in-person PowerPoint presentation on virtual consultation skills, individual practise consultations and group debrief and discussion including peer feedback (online supplemental appendix 1). The PowerPoint presentation was developed following literature review and informal discussion with clinicians

Information for students

Case 1

Setting: Video call in post-menopausal bleed (PMB) clinic.

Patient details: Mrs Marion Watt, 63 years old, DOB 15/9/57.

Background: Referred by GP for an urgent gynaecology appointment in the PMB clinic.

Visual cues: Looks well over video call. Obese, BMI 31. No cough/shortness of breath.

Figure 1 An example information sheet given to the students prior to their practise virtual consultation.

at UHW.^{1 12 20 21} The presentation included: introduction to the topic; relevance to primary and secondary care; benefits and challenges of virtual consultations; general do's and don'ts; and tips on opening the consult, history-taking, decision making and forming a management plan, and closing the consult. Teaching covered both telephone and video consultations. Students were encouraged to participate in discussion and ask questions throughout.

Following the presentation, all students took it in turn to practise a virtual consultation in video format. Each student was provided with an individual information sheet (figure 1) prior to the consultation detailing the clinic setting; patient details; brief background to the consultation; visual cues which couldn't be demonstrated by the patient actor, for example, body mass index; and an instruction for the student. Scenarios were designed by the researchers and linked to the UoG Intended Learning Outcomes for O&G including: postmenopausal bleed; heavy menstrual bleeding; ectopic pregnancy; pelvic inflammatory disease; postnatal sepsis and urinary tract infection in pregnancy.²² Students had 10 min to conduct a consultation with a virtual patient actor over Microsoft Teams. The patient actor was a clinical teaching fellow who was not known to the students. This consultation was performed in front of the rest of the group with the patient actor projected onto a large screen so that the group could observe.

Following the consultation, students regrouped and the session leader facilitated a group debrief based on the Debriefing Assessment for Simulation in Healthcare handbook²³ and Objective Structured Assessment of Debriefing tool.²⁴ Debrief lasted 10 min per student and they were encouraged to explore their reactions and feelings, overall performance, and any key learning points or areas identified for improvement. Observing students provided peer feedback on what they thought went well and any aspects they would have found challenging or done differently. Group discussion and feedback was repeated for each student. Overall duration of the sessions was 120–180 min.

Second session

A second session was run with the same group 2 weeks after the initial tutorial. The PowerPoint presentation was omitted in this session but the video consultations

and group debrief were repeated in the same manner as the first. The same set of scenarios were used but students were given a different case to before. This gave them the chance to practise a different history and apply their previous feedback to another scenario. Again, peer feedback and group discussion followed the practise consultations.

The same model was used for each of the five groups.

Timeline

The sessions were delivered in weeks two and four of the block for two reasons. First, we intended to evaluate improvement in virtual consultation skills rather than clinical knowledge. Therefore, ensuring students had at least a week of clinical experience prior to the first tutorial aimed to provide them with baseline O&G knowledge. Additionally, we wanted to allow enough time between the two sessions that we did not simply measure recall and regurgitation of their previous experience and feedback. We could not find literature on the time frame required to ensure learning rather than recall of skills specific to virtual consultations, however other studies assessing performance and confidence following simulation based education have used timelines between 1 week and 3 months.^{8 25 26} As this study evaluated confidence rather than formally assessing the skills, 2 weeks was considered an adequate length in keeping with the students' timetables and was furthered by the online survey 6 weeks later.

Study analysis

The purpose of this study was to evaluate the short term effects of a teaching programme on virtual consultation skills as well as longer term application and transferability to students' primary care placements. Results were gathered using preteaching and post-teaching evaluation tools to explore short term changes, and an online survey to evaluate longer term impact.

Teaching evaluation tools

Data were collected using identical preteaching and post-teaching evaluation tools. The tools consisted of a confidence questionnaire and a section on students' exposure to virtual consultations outside of teaching.

Confidence questionnaires measured students' confidence in four key aspects of the consultation (opening, history taking, decision making and management, and closing) before and after the teaching sessions. The questionnaires were self-developed by the researchers to match the session content and therefore evaluate each area taught. The four areas evaluated were decided when designing the teaching session as they were identified in the literature as key components of virtual consultations,¹² requiring specific virtual communication skills.^{2 7} The preteaching questionnaire was completed at the beginning of the initial session, before the PowerPoint presentation. The post-teaching questionnaire was completed at the end of the second session 2 weeks later. The questionnaires used a simple self-reported 5-point



Likert scale; 1 being not confident at all and 5 being fully confident. Participants ranked how confident they felt in each of the following aspects: opening the consult; history taking; coming to a decision and forming a management plan; and finally closing the consultation. Results were entered onto an Excel spreadsheet and data analysed to determine the mean confidence scores, SD and 95% CI preteaching and post-teaching. These results were used to calculate the mean difference between the two sessions to assess any changes in confidence following teaching.

Teaching evaluation tools also asked participants whether they had any experience either observing or conducting virtual consultations and if so what format these were in. This was used to evaluate whether students gained any experience of virtual consultations during their O&G placement, separate to our teaching.

Online survey

An online survey was sent out to all 20 participants who attended both teaching sessions, 4 weeks after the second session. This followed completion of their GP placement to evaluate the usefulness of virtual consultation teaching for primary care. The survey was created using JISC online survey tool and sent to participants' student email addresses.

Participants were asked whether they had the opportunity to perform virtual consultations while on GP placement and, if so, roughly how many per week and in what format. These results were compared with the teaching evaluation tools from their O&G placement. The survey also asked how useful they considered the teaching in preparing them for GP placement, if they thought the sessions should be continued for other students and any suggestions for improvement.

RESULTS

Teaching evaluation tools

All 21 participants completed the preteaching evaluation tool. However, one student did not attend the second teaching session and was excluded from post-teaching results.

Virtual consultation experience

Preteaching, 19 students had seen a virtual consultation and 2 had not. There was no change in experience post-teaching with two students still not having seen a virtual

consultation. There was also no change in the number of students having conducted a virtual consultation in a clinical setting preteaching and post-teaching (only one student).

Confidence scores

Table 1 demonstrates the mean confidence scores preteaching and post-teaching for each area of the consultation as well as the mean difference and percentage change for each area. These results are also shown in figure 2, demonstrating an increase in confidence in all areas studied.

Online survey

The online survey was sent to the 20 students who attended both teaching sessions, with an 80% response rate. Results show that 12 of the 16 respondents (75%) had the opportunity to perform virtual consultations on their GP placement ranging from 1 to 2 to >9 per week. These were mostly conducted via telephone with only one student given the opportunity to practise video consultations. With regard to how useful the session was for their GP placements, 14 respondents (87.5%) ranked 'very useful', two selected 'somewhat useful' and no student chose 'not useful at all'. Free-text explanations for these rankings are detailed in box 1. While formal thematic analysis was not undertaken due to the small participant number, interrogation of the data suggests two key themes. First, the usefulness of authentically practising virtual consultations. Second, increased confidence in ability to conduct a video consultation including transferring these skills to telephone or face-to-face settings.

All 16 respondents answered 'yes' they considered it worthwhile continuing this teaching for future students. While nine students had no suggestions for improvement, other suggestions included running more sessions, practising telephone consultations or using translator services. One student commented that they considered one teaching session enough as the second felt a little repetitive. These responses are listed in box 2.

DISCUSSION

Our study demonstrates the potential use of new technologies for the future of medical education. As discussed, the pandemic has led to a change in practice with increasing use of online interfaces for patient, student

Table 1 Mean confidence scores (ranging 1–5) preteaching and post-teaching, 95% CI, mean difference and percentage (%) change in confidence for each area of the consultation studied

Area of consultation	Mean preteaching score (95% CI)	Mean post-teaching score (95% CI)	Mean difference (mean % change)
Opening	2.67 (2.21 to 3.13)	4.70 (4.50 to 4.90)	+2.03 (+40.6%)
History taking	3.38 (3.07 to 3.69)	4.45 (4.19 to 4.71)	+1.07 (+21.4%)
Decision/management	2.62 (2.28 to 2.96)	3.90 (3.66 to 4.14)	+1.28 (+25.6%)
Closing	2.81 (2.45 to 3.17)	4.60 (4.38 to 4.81)	+1.79 (+35.8%)

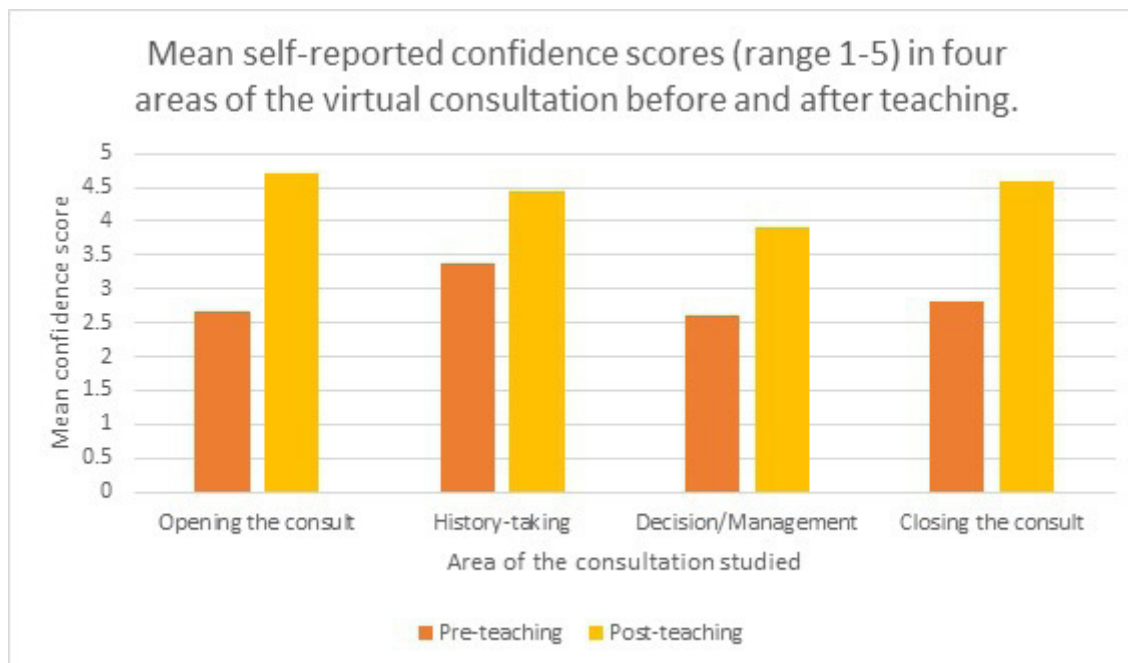


Figure 2 Mean confidence scores (ranging 1–5) preteaching and post-teaching, for each area of the consultation studied.

and colleague interactions.^{1 17 18} This has brought with it unique barriers and the need for clinicians to adapt and learn new techniques alongside generic communication skills.^{2 7} Following this, we aimed to create a teaching session which embraced these technologies and provided students with virtual consultation skills. We found that our session had two main benefits.

First, our results show that students considered teaching on virtual consultation skills a useful topic. The online survey demonstrated positive free-text feedback. Students highlighted that skills learnt were transferable to primary care where virtual consultations are part of their placement. It is also encouraging that all respondents considered the sessions worthwhile continuing and the majority rated them as ‘very useful’. These findings were reflected in the preteaching and post-teaching evaluation tool results with an increase in confidence in all aspects of the consultation studied. Reviewing our free-text feedback we note that students’ GP experience of virtual consultations was mostly via telephone (box 1) and this was also seen in their suggestions for improvement (box 2). While our teaching session covered both elements in the PowerPoint presentation, students only practised video consultations. Video and telephone consultations have been found to be similar in content, structure and duration with the main difference being lack of visual cues over the telephone.^{18 9} It was therefore interesting to see that students considered the sessions useful and skills transferable to GP despite a change in medium. If considered beneficial, our teaching structure could be adapted to include telephone consultations as the practical element. Thus far, teaching on virtual consultations has mostly been aimed at clinicians.^{1 3 11 12} However, as they are likely to remain

following the pandemic,⁵ we believe it is an important skill to teach students early on.

Second, we have shown that there is scope to use virtual platforms in novel, creative ways for educational purposes. Online interfaces have mostly been used in medical education for delivering large lectures and small group tutorials.¹⁸ However, techniques such as telesimulation have been introduced for delivering quality distance learning including formative and summative Objective Structured Clinical Examinations (OSCE).^{27 28} Using Microsoft Teams in small group sessions, we were able to provide useful communication skills teaching despite clinical restrictions. Students have had limited patient exposure during the pandemic due to social distancing, cancellation of placements and reductions in clinics.^{15–17} This has resulted in students feeling less prepared for foundation training as well as a lack of clinical competence, particularly in patient-facing skills.^{17 18 29} With over a year of disruption to medical education, we believe it is our responsibility as educators to adapt accordingly and produce new teaching methods to help improve student confidence and preparedness for the future.

Despite these encouraging findings, one main limitation of this study was the small sample size (n=21). This study was conducted in the O&G setting in National Health Service (NHS) Lanarkshire and therefore results may not be generalisable across the board. However, this pilot study to evaluate a novel teaching method has shown positive initial results with transferability to primary care. While our study setting was specific to O&G, the general skills taught were intended to be applicable to virtual outpatient clinics from any department. It is hoped that other specialties will incorporate and adapt

Box 1 Student rationale behind ranking of how useful the teaching session was for GP placement.

Student free-text feedback

Virtual consultations were a novel concept for me so it was very useful to have some training on how to conduct these.

Familiarity

This was the only formal teaching we have ever received on remote consultations, it was really useful to be able to practice these in a teaching setting to realise common mistakes. It was definitely beneficial to my GP block!

Useful to have a structure to approaching telephone consultations and made the experience less daunting

It was good to experience using the format in a simulation before undertaking genuine consultations

It was good to practice techniques before speaking to patients

Not specifically to my GP placement, but in preparing me for the many virtual consultations I will have in the future it was useful to get some guidance. I enjoyed the sessions they were fun to participate in.

Good preparation for virtual consultation, especially in terms of eliciting a clear history and deciding whether the patient needed seen face to face

Good skills

It was helpful to have a go at a virtual consultation in a supportive environment

Great idea for teaching sessions! Good practice and made me feel more confident in conducting telephone consultations

Many transferrable skills taught that could be used in telephone consultations.

Good to go over key points important in a virtual consultation but it is quite intuitive and don't feel it differs significantly to how you would handle a face to face consultation

It was very useful but all the video training aspects were meaningless as I didn't do any video consultations

Even though I didn't have any virtual consultations, the skills gained were useful in face to face scenarios.

Good practice for virtual consultations

GP, general practitioner.

Box 2 Student responses to whether they had any suggestions for improvement of the virtual communication skills teaching session.

Student free-text feedback

No, it worked really well

Try telephone consultation in addition to video consultation as it may be more difficult since unable to see patients but is more likely to be done in actual practice

Maybe including some tips for phone consultations, this was primarily the method used at my GP

Perhaps only having the one session is enough. Two sessions of virtual consultations seemed a little repetitive

No. It was well run and the scenarios were realistic. The performance of the hosts was good enough so no actors are necessary. Possibly try to simulate the use of an over the phone translation service?

Nothing

No—I liked the sessions as they ran.

More sessions! Very good practice

Maybe phone call sessions too

N/A

No

No—just continue these sessions! Thank you.

No

No

No it was all great thanks

No, was a really comprehensive session

this method or that universities may consider including it in the curriculum as a specific communication skill. For example, this could potentially be included within the already established UoG fourth and fifth year communication sessions while on GP placement. This would allow for future research evaluating the impact of teaching on a larger scale in different settings.

In particular, it would be useful in further studies to assess the impact of intervention on competence. Our study evaluated the teaching methods by measuring changes in student confidence, however, the link between self-reported confidence and proficient knowledge or skill is complex.³⁰ When using confidence questionnaires there is the possibility of increased confidence with an unmatched increase in skill.³¹ The literature demonstrates mixed results with some studies showing correlation between performance and confidence,³² particularly post-training,³⁰ but others finding that teaching can lead to inappropriate overconfidence.^{25 31} Consequently, it would be important to assess teaching using objective performance indicators to ensure self-reported

confidence correlates with skills learnt. One way competence and performance could be evaluated is through OSCE style observation of the skill preteaching and postteaching to increase objectivity of results. This has already been explored by one group in New York who have developed an assessment tool to evaluate both core communication and virtual specific skills in a video consultation OSCE station.⁷ We did not assess competency but instead used the online questionnaire free-text feedback to further support and validate our findings from changes in confidence.

Another important consideration is whether students' ongoing placements influenced results. The sessions were delivered 2 weeks apart, during which time students were still attending O&G placement and therefore expanding their clinical knowledge and experience of the specialty. This may have influenced the findings with an increase in confidence related to exposure rather than teaching. While it was not possible to eliminate this factor, we attempted to minimise its impact by altering the scenarios students conducted. We also ran the first session in week two of the placement to ensure participants had some prior O&G exposure and knowledge. Our results show the greatest increases in confidence were in the areas most specific to virtual consultations—opening and closing. The literature on virtual clinics focuses on tips for these areas rather than history-taking and forming management plans, which are similar to a traditional face-to-face consultation. This highlights that opening and closing virtual consultations are novel skills for clinicians and students.^{1 19 20 33} Additionally, there was no increase

in the number of students performing virtual consultations in the post-teaching questionnaire, showing that they were not being given the opportunity to do so as part of their O&G placement. Consequently, we believe that while placement exposure may have had some influence on results, the increases in confidence seen are more likely attributable to teaching. However, these factors cannot be excluded and results should be considered in the study setting.

CONCLUSION

Our research found that a two-part teaching session on virtual communication skills improved final year medical students' confidence in four key aspects of the consultation. Furthermore, these skills were transferable from O&G to primary care where virtual consultations are part of students' placements. It is important that medical education keeps pace with evolving clinical practice to ensure we continue to produce doctors with the skills required to work effectively and safely. The pandemic has provided the opportunity to explore new teaching methods which, if used effectively, can be continued in the future. Considering recent changes, we believe that teaching medical students virtual consultation skills should be incorporated into undergraduate medical education and training. Further research is suggested to explore the effects of our teaching model on competence.

Contributors As lead author and guarantor of the work, EB confirms that all contributing authors meet the four ICMJE criteria for authorship as per BMJ requirements. Contributions are as follows. EB: project design and conception; acquisition, analysis and interpretation of results; initial draft write up. KM: acquisition, analysis and interpretation of results; critical revision of the initial draft. EF: project design and conception; critical revision of the initial draft. CP: project design and conception; critical revision of the initial draft. All authors were involved in approval of the final submission and agree to be accountable for all aspects of the work.

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Ethics approval As this study involved human subjects, work was conducted in accordance with the Declaration of Helsinki, including guaranteeing the anonymity of participants and obtaining informed consent. The UoG ethics board reviewed the research proposal and the study was deemed exempt from ethical approval requirements without amendments.

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