Multi-site Videoconferencing Teaching in South East Scotland Region: Continuing Medical Education

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Abstract: Videoconferencing teaching methods are commonly used in medical education to deliver multi-site teaching. However, many studies have shown problems relating to this type of teaching [1-9]. In the South East region of Scotland, videoconferencing teaching for foundation doctors is conducted between three hospital sites. Poor feedback about the quality of this teaching prompted the investigators to perform a quality improvement study to explore problems with videoconferencing in this setting, and if applicable, apply interventions to improve this teaching. After a literature review, a data collection tool was created and distributed to doctors participating in this teaching. Thirteen questionnaires were completed which highlighted problems mainly relating to technology and poor interaction between sites. As a result of these findings, the investigators have implemented interventions to rectify these issues and ultimately improve the teaching that this region delivers.

Key words: Videoconferencing, medical education, telemedicine.

1. Introduction

Videoconferencing is widely used in continuing medical education, and studies have demonstrated it is an effective and efficient method to deliver teaching in rural settings [1-8]. With our ever-expanding technology driven society, videoconferencing seems an appealing option to deliver teaching [2].

Despite this, feedback from learners participating in videoconferencing teaching is poor [2]. There are some difficulties associated with videoconferencing which include poor student interaction and decreased rapport with teachers [1-8].

In the South East Region of Scotland, videoconferencing was used to facilitate teaching sessions for foundation year doctors (i.e. junior doctors) who are in district hospitals throughout their training. This involved a teacher at a base site, and two other hospitals linked in via videoconferencing, with a maximum of up to 20 doctors throughout the three sites. The teaching consisted of a power-point presentation delivered by senior medical staff, topics relevant for the audience.

Feedback by foundation doctors participating in this teaching was poor. Thus, this study aimed to explore problems with videoconferencing in this setting, allowing creation of recommendations to improve the quality of videoconferencing teaching.

2. Methods

2.1 Literature Review

The investigators completed a literature search to identify any evidence of articles studying the problems associated with videoconferencing teaching. Studies were identified by searching the following online databases: Medline, EMBASE and the NHS knowledge network. The searches were limited to papers published between 1990 and January 2015 and articles in English language. The common search terms used included: Videoconference* telemedicine* and “exp education, medical/exp education, graduate” or “foundation” or “junior doctor”.

Papers were included if they met the following criteria: (1) Participants were doctors; (2) Videoconferencing based education was reviewed; (3)
Videoconferencing was assessed via doctor’s perception of this method of teaching for continuing medical education. Exclusion criteria included: (1) Undergraduate teaching; (2) Allied health professional teaching; (3) Videoconferencing assessed by the value of this method for improving clinical practice and knowledge; (4) Online methods of teaching.

2.2 Creation of Themes and Data Collection Tool

The problems or issues important in videoconferencing highlighted from the Literature Review were grouped into “themes”. These “themes” were categorised depending on the type of problem that was experienced. A data collection tool was created, incorporating qualitative and quantitative data (Appendix A). This was distributed to foundation doctors undergoing teaching for completion.

2.3 Questionnaire Analysis

The questionnaires were analysed to confirm if the problems highlighted from the literature search were comparable to what foundation doctors were experiencing in our setting.

2.4 Recommendations for Improvement in Videoconferencing Teaching

Interventions to improve the problems highlighted from the data collected were created and recommendations for videoconferencing teaching were distributed.

3. Results

3.1 Literature Review

All studies reported problems relating to videoconferencing teaching. Most the problems were related to lack of interaction between doctors at distant sites with the teacher, as well as problems with the videoconferencing technology.

Table 1 shows the four themes that were created from the literature search which included: (1) Issues relating to the learners; (2) Issues relating to the teacher; (3) Technology problems; (4) Organisational problems.

3.2 Quantitative Questionnaire Data

We examined thirteen completed questionnaires from foundation doctors who had attended videoconferencing teaching throughout their placements. Tables 2 and 3 highlight the mean scores from each of the different categories in the questionnaire.

Responses for a separate question relating to the frequency of technical problems are highlighted in Fig. 1.

Further to this, responses to “what technical problems did you experience” are shown in Fig. 2.

3.3 Qualitative Questionnaire Data

Many issues that had been highlighted from the literature search were conveyed in the areas available for comments regarding videoconferencing teaching. Some comments relating to problems with technology are highlighted in Fig. 3.

Lastly, the investigators asked for ways to improve the videoconferencing experience for the doctors. One comment is highlighted in Fig. 4.

3.4 Recommendations

We divided our recommendations based on the “technical” and “non-technical” issues.

<table>
<thead>
<tr>
<th>Learners</th>
<th>Teachers</th>
<th>Technology</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with teacher</td>
<td>Interaction with learners</td>
<td>Camera quality</td>
<td>Sessions organised</td>
</tr>
<tr>
<td>Interaction with learners</td>
<td>Camera angle</td>
<td>Audio quality</td>
<td>Site facilitator</td>
</tr>
<tr>
<td>Worthwhile</td>
<td>Supporting material</td>
<td>Slide quality</td>
<td></td>
</tr>
<tr>
<td>Acceptable</td>
<td>Prior training beneficial</td>
<td>Setting up equipment</td>
<td></td>
</tr>
<tr>
<td>Ease to generate discussion</td>
<td>Quality of presentation</td>
<td>Technical problems</td>
<td></td>
</tr>
</tbody>
</table>
Table 2  Mean scores relating to learners and teachers*.

<table>
<thead>
<tr>
<th>Learners</th>
<th>Mean</th>
<th>Teachers</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable method of teaching</td>
<td>2.7</td>
<td>Interact verbally</td>
<td>2.8</td>
</tr>
<tr>
<td>Meets educational needs</td>
<td>2.7</td>
<td>Interact non-verbally</td>
<td>1.8</td>
</tr>
<tr>
<td>Worthwhile teaching</td>
<td>2.5</td>
<td>Interaction more at same site</td>
<td>4.6</td>
</tr>
<tr>
<td>Good interaction with teacher</td>
<td>2.4</td>
<td>Guide discussion</td>
<td>2.9</td>
</tr>
<tr>
<td>Good interaction with learner</td>
<td>1.8</td>
<td>Clear presentation</td>
<td>2.4</td>
</tr>
<tr>
<td>Able to raise a point/question</td>
<td>2.5</td>
<td>Visible at all times</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard copies</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beneficial to receive training</td>
<td>3.5</td>
</tr>
</tbody>
</table>

*Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Table 3  Mean scores relating to organisation and technology*.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Mean</th>
<th>Technology</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching well organised</td>
<td>2.0</td>
<td>Audio satisfactory</td>
<td>3.3</td>
</tr>
<tr>
<td>Site facilitator would be beneficial</td>
<td>4.2</td>
<td>Camera satisfactory</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slide quality satisfactory</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting up easy</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*Scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

Fig. 1  Responses to “How often were there technical problems?”

Fig. 2  Responses to “what technical problems did you experience?”
The technical issues drawn out from the questionnaire could be resolved by making a “step-by-step guide” for setting up the videoconferencing equipment. At present, only one site out of the three has a guide for this purpose. In addition, the possibility of a technical administrator to guide doctors if problems arise either on-site or being able to be contacted by a dedicated phone number would be invaluable. This also allows the base site and teacher to be aware doctors at other sites are unable to hear the presentation or contribute to teaching.

The non-technical issues highlighted in the questionnaire open scope for the possibility of a videoconferencing module for the foundation doctors and teachers to participate. There is also scope for a participant “ground rules” document, whereby participants are informed of certain etiquette during videoconferencing teaching. We have made versions of these in relation to the teacher and learners (Appendix B).

4. Discussion/Conclusions

Videoconferencing is an effective method of delivering teaching, but several studies have highlighted the difficulties with this form of education [1-8]. In our local teaching hospitals, we noticed poor feedback from foundation doctors attending videoconferencing teaching. We conducted a quality improvement study to supply recommendations to optimise this type of teaching in this setting. The results highlighted technical and non-technical issues relating to videoconferencing teaching, consistent with other studies [1-8].

Technical issues majorly disrupted teaching in this setting. Sometimes doctors were not able to communicate with other sites, or the teacher, or even unable to connect to the base site therefore missing teaching entirely. Often, doctors were leaving busy clinical wards and there was delays in setting up this teaching therefore missing the start of a presentation or lecture. Creating a step-by-step pathway for setting up the videoconferencing equipment would hopefully eliminate the possibility of doctors not being able to connect to other sites. In addition, having a technical administrator as by used in other studies would create a smoother start to teaching [3].

There were multiple non-technical issues highlighted from our study, mainly relating to lack of interaction between all sites. Teachers may not have had relevant teaching or guidance in relation to videoconferencing teaching. This is an area which could be enhanced by making a training course for teachers to deliver videoconferencing teaching. We did not elucidate problems highlighted from teachers, which could be assessed in the future.

Poor interaction was also related to the doctors. Often doctors are not at the site where the teacher is felt that they were unable to “interrupt” the teaching, leading to them not participating in answering questions and keeping the “mute” button on. Smoother interaction could be achieved by making a “ground rules” document, which all learners and teachers have read, highlighting the formal etiquette for participating in this type of teaching. Our version, as highlighted in Appendix B, incorporates ways to
either ask a question or answer a question in this type of setting.

References


Appendix A:

Videoconferencing Questionnaire

(A) Learners

With regards to the videoconferencing (VC) teaching sessions,

1. I find them an acceptable method for receiving teaching.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

2. They can meet my educational needs.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

3. They are a worthwhile use of time dedicated for teaching.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

4. I can interact and generate discussion with the teacher.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

5. I can interact and generate discussion with learners at other sites.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

6. If I would like to raise a point/ask a question, it is clear how to attract the teacher’s attention so that my need(s) can be addressed (for example, via visual cues).
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

(B) Teachers

With regards to the teachers,

7. They interact well with me verbally.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

8. They interact well with me non-verbally.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

9. They interact more with the learners who are at the same site as them.
   - Strongly disagree
   - Disagree
   - Neutral
   - Agree
   - Strongly agree

10. They can guide discussion during the session.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

11. They deliver a clear, structured presentation that is easy to follow via VC.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

12. They are visible always.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

13. Hard copies of resources (e.g. presentation handouts) are available.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

14. It would be beneficial for teachers who deliver VC sessions to receive training for facilitating this mode of teaching.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

(C) Organisation of sessions

15. The sessions are well organized.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

16. A site facilitator to help with videoconferencing would be beneficial.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree
(D) Videoconferencing technology

With regards to the videoconferencing technology during the sessions,

17. The audio component was satisfactory.
   Strongly disagree  Disagree  Neutral  Agree  Strongly agree

18. The image of the camera feed was satisfactory.
   Strongly disagree  Disagree  Neutral  Agree  Strongly agree

19. The slides were visible and easy to read.
   Strongly disagree  Disagree  Neutral  Agree  Strongly agree

20. I am confident using and setting up the equipment.
   Strongly disagree  Disagree  Neutral  Agree  Strongly agree

21. How often were there technical problems?
   Never  Rarely  Sometimes  Often  Very frequently

If answered Never to 20, please go to Section E.
Otherwise, please answer questions 22 & 23.

22. The teacher can adapt the sessions if there is a technical problem.
   Strongly disagree  Disagree  Neutral  Agree  Strongly agree

23. Please comment on what technical problems you experienced throughout this session.

(E) General

With regards to videoconferencing,

24. It is as good as a live presentation for a method of teaching.
   Strongly disagree  Disagree  Neutral  Agree  Strongly Agree

25. Overall, the sessions are:
   Poor  Fair  Average  Good  Excellent

26. Please write two things that could be done to improve the VC teaching you receive.

Thank you for taking the time to complete this questionnaire.

Appendix B:

VC Etiquette—Learners
1. Zoom the camera in to the group so everyone is in the picture and film.
2. Make sure everyone can be heard clearly and re-position the microphone on the table if needed.
3. Speak clearly when interacting with those at different sites.
4. If your site is not speaking for a while, mute the microphone (microphone is sensitive and other sites may hear background noise very clearly, disrupting the session).
5. If you would like to raise a point/question, put on your microphone (if off), signal by raising your hand and begin speaking.
6. There can be an audio-lag with the videoconferencing equipment, therefore pause before responding to questions or when you are discussing a topic.

VC Advice—Presenters

(A) Prior to the session:
• Meticulously plan the teaching session so it is structured and organized prior to it taking place.
• Familiarise yourself with the videoconferencing equipment so that you are able to turn on the equipment and connect with other sites.
• A handout of the presentation is invaluable for the Foundation year doctors, if you can email your presentation to the administrator who can circulate this to the doctors prior to the session.
  • With regards to the visual presentation:
    - Text at least font 28 to 32;
    - Arial or Sans-serif text;
    - 5-7 lines of text only per slide;
    - Paler background with darker text for slides.

(B) At the session:
• Introduce yourself and make sure that all learners from all sites are connected and can hear you.
• Give a clear plan to the doctors of how the session will run:
  - what the objectives are for the session;
  - what will be happening in the session;
  - what is expected of the audience.
• Establish at what points there will be time for discussion/questions.
• Make it clear how doctors at distant sites can raise a point throughout the session if they would like to.
• Ask students to mute microphones at distant sites to avoid disruption (until question period commenced).
• When presenting:
  - Address both remote and local sites;
  - Be visible to all students at all sites;
  - Eye contact between all sites is important;
  - Speak clearly.
• During the question/discussion periods:
  - Using an ‘ice breaker’ or getting students to raise their hands to questions you ask may help establish interaction;
  - Appreciate there is audio-delay with the VC equipment, therefore pause before speaking during interaction with doctors.
• If there is a technical problem:
  - Try to correct the technical problem by referring the technical guides in the room;
  - Contact the site facilitator for help;
  - Having handouts during this time would be invaluable for doctors to still gain some benefit from the session despite technical difficulties.