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Benefits and drawbacks of videoconferencing for collaborating multidisciplinary teams in regional oncology networks: a scoping review

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ABSTRACT

Introduction Various forms of videoconferenced collaborations exist in oncology care. In regional oncology networks, multidisciplinary teams (MDTs) are essential in coordinating care in their region. There is no recent overview of the benefits and drawbacks of videoconferenced collaborations in oncology care networks. This scoping review presents an overview of videoconferencing (VC) in oncology care and summarises its benefits and drawbacks regarding decision-making and care coordination.

Design We searched MEDLINE, Embase, CINAHL (nursing and allied health) and the Cochrane Library from inception to October 2020 for studies that included VC use in discussing treatment plans and coordinating care in oncology networks between teams at different sites. Two reviewers performed data extraction and thematic analyses.

Results Fifty studies were included. Six types of collaboration between teams using VC in oncology care were distinguished, ranging from MDTs collaborating with similar teams or with national or international experts to interactions between palliative care nurses and experts in that field. Patient benefits were less travel for diagnosis, better coordination of care, better access to scarce facilities and treatment in their own community. Benefits for healthcare professionals were optimised treatment plans through multidisciplinary discussion of complex cases, an ability to inform all healthcare professionals simultaneously, enhanced care coordination, less travel and continued medical education. VC added to the regular workload in preparing for discussions and increased administrative preparation.

Discussion Benefits and drawbacks for collaborating teams were tied to general VC use. VC enabled better use of staff time and reduced the time spent travelling. VC equipment costs and lack of reimbursement were implementation barriers.

Conclusion VC is highly useful for various types of collaboration in oncology networks and improves decision-making over treatment plans and care coordination, with substantial benefits for patients and specialists. Drawbacks are additional time related to administrative preparation.

Strengths and limitations of this study

- This is a scoping review that identified the benefits and drawbacks of videoconferencing for collaborating teams in oncology networks.
- This is an indepth analysis with detailed mapping of multidisciplinary teams collaborating in regional oncology networks showing the benefits and drawbacks.
- The study provides organisational, logistical and technical recommendations for collaborating teams who want to consider or optimise videoconferencing usage.
- The results of some of the included studies were open to possible misinterpretation because the aims and qualitative descriptions were often not clearly explained.

INTRODUCTION

In oncology care, there are different types of collaboration between teams when coordinating integrated care for their patients.[1–4] Some teams treating rare tumours search out the expertise of specialised national and international experts, who then share their knowledge. Some teams in palliative oncology care consult specialists while caring for patients in the last phase of their life. Further, multidisciplinary teams (MDTs) in regional oncology networks are essential to provide a treatment plan and to coordinate care in their region. MDTs consist of specialists who focus on evidence-based treatment of patients. Oncology guidelines summarise the various key specialisms required for treating modalities in surgery, medical oncology and radiotherapy and for the different imaging specialisms depending on the biology of the tumour.[5 6]

In the 1990s, videoconferencing (VC) was introduced in oncology networks to address care pathways for high-complexity, low-volume care and for rare tumours. With VC, members of MDTs based in different locations but treating the same patient do not need to physically attend the multidisciplinary team meetings (MDTMs). Imaging, pathology and laboratory information

could be shared during a VC session.[7 8] VC-MDTMs are often in addition to institution-based meetings, increasing workload and requiring coordination.

Scoping reviews are used to identify, retrieve and summarise literature relevant to a particular topic. They aim to identify and map the key concepts underpinning a research area, the main sources and the types of evidence available.[9–11] They typically do not include a process of quality assessment.[10 12] In an earlier scoping review of clinical applications of VC,[13] the characteristics of the studies included were summarised, but the benefits and drawbacks were not evaluated. In a more recent review regarding e-health, VC was mentioned, along with its benefits and drawbacks, but not specifically for collaborating teams within oncology networks.[14] An overview of the benefits and drawbacks would be helpful for policymakers and for teams collaborating across different locations in deciding whether to introduce VC to improve care coordination, lower costs and reduce travel time.

The current scoping review was designed to provide an overview of different types of VC by teams collaborating in oncology networks. It then focused on those MDTs that discuss diagnostic and treatment plans and coordinate care within their regional oncology network. As such, our research questions were formulated as the following:

- How does VC contribute to decision-making of collaborating teams in oncology care at different locations?
- What benefits and drawbacks of VC are perceived by MDTs in coordinating care in their regional oncology network?

METHODS

This review is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Scoping Reviews.[15] The objectives, inclusion criteria and methods adopted in this scoping review were specified in advance and documented in a protocol (online supplemental file 1).

Sources and search strategy

We searched four electronic databases, MEDLINE (PubMed), Embase (embase.com), CINAHL (nursing and allied health, EBSCO) and the Cochrane Library, from inception of the databases to 27 October 2020.

The searches were developed in collaboration with an information specialist (SvdW). The search strategies were based on three concepts: (1) multidisciplinarity, (2) VC and (3) oncology. For each concept, a controlled vocabulary (including medical subject heading terms) and free-text terms were combined (online supplemental file 2). No time or language restrictions were applied. In addition to the database searches, the references of the included studies were also screened for additional relevant articles.

Screening and selection

Two reviewers (LSvH and PD) independently assessed the titles and abstracts. If the title and abstract provided insufficient information, or the reviewers disagreed, the full text was assessed by the same reviewers to determine inclusion. If the reviewers disagreed over a full-text assessment, it was then discussed, and if no consensus was achievable an independent reviewer (JR) provided a binding verdict.

Inclusion and exclusion criteria

To map different types of VC collaboration in oncology networks, we included studies if they were (1) describing research on oncology care pathways, (2) original research, (3) full text, (4) describing VC to communicate between teams at different locations, and (5) reporting the benefits and drawbacks of VC use. Studies were excluded if (1) VC was only used for telemedicine,[16 17] indicating one of the groups at a location were patients only, (2) VC was solely used for research or education, or (3) the article was a review, letter to an editor or congress abstract.

Data extraction and analysis of subsets

Screening and selection

Two reviewers (LSvH and PD) independently assessed the titles and abstracts. If the title and the abstract provided insufficient information, or the reviewers disagreed, the full text was assessed by the same reviewers to determine inclusion. If the reviewers disagreed over a full-text assessment, it was then discussed, and if no consensus was achievable an independent reviewer (JR) provided a binding verdict.

In phase 1 of this scoping review, the following data were extracted for all the included studies: country of the teams using VC, aim of the study, research method and data source, number of cases discussed, number of VC and face-to-face MDTMs, benefits and drawbacks, frequency of VC-MDTMs, tumour type and study period. Based on these data, we performed a thematic analysis to distinguish different types of collaboration through VC. The similarities and differences were mapped by type.

Since we were particularly interested in the types of collaboration adopted within regional oncology networks, we mapped the specific types of VC collaboration in detail regarding similarities and differences, and summarised the reported benefits and drawbacks, the members of the MDTs who discuss diagnostic and treatment plans, and specifics of the VC platform used. In assessing the collaborating MDTs, we mapped VC participants for the cancer treatment's surgery, oncology and radiotherapy modalities, and described the VC platform used.

If data were not sufficiently described in the paper reviewed, we looked in referred papers (describing the same study) or contacted the corresponding author via email, asking them to provide the missing information.

Patient and public involvement

This study was a scoping review on the use of VC by collaborating teams in oncology networks and therefore the study did not seek patient and public involvement.

Figure 1: PRISMA-Scoping-Review flow diagram of study selection

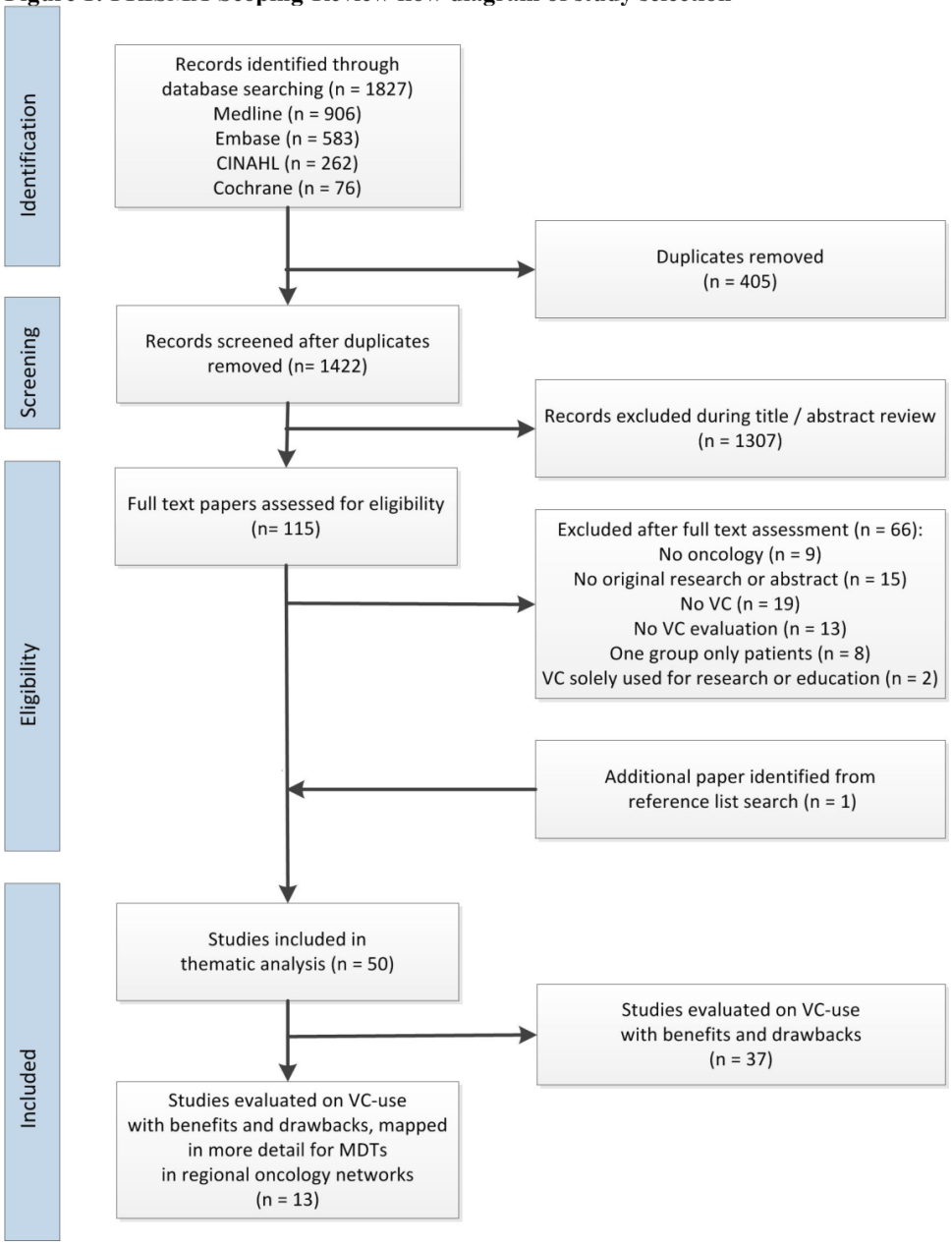

Figure 1 PRISMA-Scoping Review flow diagram of study selection. MDTs, multidisciplinary teams; PRISMA, Preferred Reporting items for Systematic Reviews and Meta-Analysis; VC, videoconferencing.

RESULTS

A total of 1422 unique records were identified (figure 1). From this, 115 papers were selected for full-text assessment and 1 further paper was found in a reference list of an included study. After full-text assessment, 50 studies remained for data extraction (online supplemental file 3).

Study characteristics

VC was described in 37 studies related to oncology treatment for adults, 5 studies for children and adolescents, and 8 studies on palliative care. VC was most frequently described for teams working in the USA (n=12), UK (n=7) and Germany (n=5) (online supplemental file 4). In 11 studies, multiple types of tumours were treated, 12 focused on breast cancer, 11 on gastrointestinal cancer, 8 on lung cancer, 6 on head and neck cancer, and 17 on various other specific cancer types (online supplemental file 5). The frequency of multidisciplinary meetings ranged from daily to monthly.

Considerable heterogeneity was found between the studies concerning research methods, data sources, primary outcome and details of reporting. Four prospective studies, of which two were randomised controlled trials, were included. Qualitative research methods (eg, interviews and participating observations) and quantitative methods (eg, surveys and database analysis) as well as mixed methods were applied in the studies.

The most frequently used research method in the reported studies was review of databases, case records or VC notes (31 studies). A survey among healthcare professionals or patients and their families on the use of VC was also a frequently applied method (23 studies). In 23 studies, two or more data sources were combined. In some studies, the aims, methods and data sources were not clearly described; we deduced the most likely aims, methods and data sources, which are shown in italics in the tables in the online supplemental file 5.

Thematic analysis and synthesis of subsets

Six types of team collaboration in oncology care were distinguished (table 1): (1) Expert MDTM-national: provides expertise and experience on rare tumours nationally (17 studies)[18–34]; (2) Expert MDTM-International: provides international expertise and experience on rare tumours (5 studies)[35–39]; (3) Expert Consultation: physicians caring for complex patients seeking a consultation with experts (11 studies)[40–50]; (4) Consultation Specialist-Nurse: nurses consulting with palliative treatment specialists in specialised palliative care units or hospices (4 studies)[51–54]; (5) MDT-Equal: involving more or less equal MDTs that use each other for a 'fresh look' to optimise the diagnostic and treatment plans for complex cases (5 studies)[55–59]; and (6) MDTM-Collaborate: MDTs collaborating to form one MDTM (8 studies)[60–67] (online supplemental file 5).

We used the term 'MDT-Equal' for teams that had broadly equal expertise and know-how in treating a specific type of patient. Here, the opting to use VC was to optimise treatment plans and to coordinate care. To be classified as such a team, at least two key specialisms for diagnosing and treatment and at least two specialists needed to be present at each site. In comparison, the term 'MDTM-Collaborate' is used for teams that have complementary expertise and need each other to make a complete team of experts to treat and to coordinate care for a specific type of patient. Together the individual teams form an MDTM and through this comply with national legislation and oncology guidelines.

Since the focus of this scoping review was on the collaboration of teams in regional oncology networks, we reported on the detailed mapping for MDT-Equal and MDTM-Collaborate (13 studies; online supplemental file 6). We discussed the different topics with the amount of studies in which it is reported.

Benefits and drawbacks of MDT-Equal and MDTM-Collaborate

VC in MDT-Equal and MDTM-Collaborate is aimed at collaboration in a regional oncology network. First we will discuss the common benefits and drawbacks related to collaboration in a regional oncology network, and thereafter we will discuss the separate benefits and drawbacks of MDT-Equal and MDTM-Collaborate (table 2, online supplemental files 6 and 7).

Common benefits

VC enhanced multidisciplinary discussions between specialists and other healthcare professionals on diagnostic and treatment plans in all 13 studies where this was investigated.[55–67] VC strengthened their collegial networks or established new partnerships, resulting in virtual management of regional oncology networks. In this way, VC facilitated collegial support and reduced professional isolation. VC was shown to reduce travel for specialists (6 studies),[56 58 62–64 67] although only two studies evaluated costs in detail.[57 58]

Care coordination was considered to be improved (11 studies).[55–57 59–63 65–67] VC discussions on complex cases were considered educational for younger specialists and were a form of on-the-job training (5 studies).[56 57 60 61 66] Most studies reported that MDTM participants would be willing to replace face-to-face meetings to discuss treatment plans for their patients with VC-MDTMs if the benefits outweighed the drawbacks and the technology would support it at lower costs.[55–63 65–67]

Common drawbacks and solutions

It was difficult to get all the information needed prior to case presentations during VC, and workload increased as more cases were registered over time (9 studies).[55 57–59 61 62 64 66 67] Using a structured format to gather information made case presentations more concise and complete and reduced the workload. Discussions in MDTs were found to be time-consuming and MDT members questioned whether all cases should be presented, as in the guidelines, or only complex cases that would benefit patients by optimising treatment plans (5 studies).[58–60 66 67] The costs of VC equipment and the lack of reimbursement were reported as an implementation barrier, although some insurance companies were willing to discuss reimbursement if VC costs would be lower than face-to-face (3 studies).[57 58 61] The administrative workload increased because digital CT images had to be transmitted to a viewing station, which had to be planned and executed by all teams involved before a meeting (5 studies).[57 60–62 64] Also, the available bandwidth could not be used for both data and video (images and sounds) at the same time.

Benefits of MDT-Equal

Using VC between equal teams led to optimised diagnostic or treatment plans for complex cases and provided easy access to second opinions (5 studies).[55–59] Recommendations given during VC to treatment plans resulted in less correspondence between MDT members (3 studies).[56 58 59] VC was also used for aligning protocols, with peer review principles being used to stimulate working according to oncology guidelines (2 studies).[58 59] VC between collaborating institutes within a region was stimulated by the health insurance company, favouring VC if it lowered costs (1 study).[58]

Drawbacks and solutions of MDT-Equal

In the collaboration of a cancer centre with its partner, holding three MDTMs weekly (two face-to-face on-site MDTMs and one VC-MDTM) was seen as time-consuming

Table 1 Features of the types of VC collaboration identified in oncology networks

Feature vs type	Expert MDTM-National	Expert MDTM-International	Expert consultation	Consultation Specialist–Nurse	MDT-Equal*	MDTM-Collaborate†
Healthcare professionals in VC meeting	Same type of specialists in national expert team discusses with MDTs at different locations via VC.	Specialists of an MDT in one country give advice to and discuss with MDTs in a low-income country via VC.	Specialists with expertise give advice via VC to treating physicians.	Consultant for palliative care gives advice via VC to nurses in palliative care unit or hospice on care plan.	Same type of specialists in MDTs at different locations discusses via VC.	Complementary specialists at different locations together form a single MDTM via VC.
Number of healthcare professionals	≥2 each site.	≥2 each site.	1 or more.	1 or more.	≥2 each site.	≥2 each site.
Purpose	Provide expert opinion and advice on diagnostic or treatment plan.	Provide expert opinion and advice on diagnostic or treatment plan.	Provide expert opinion and advice on treatment plans.	Provide medical specialist advice on care plans and incident handling.	Optimise diagnostic or treatment plan made in on-site MDTM.	Formulate diagnostic or treatment plan.
Setting	National outreach‡: university centre to regional oncology networks.	International outreach‡: experts support oncology treatment in another country.	Consultancy for specific expertise for rare tumours.	Regional network-specific collaboration.	Regional network: cancer centre with general hospital.	Regional network: cancer centre with general hospital.
Patient travel	No.	No.	No.	No.	Prevent unnecessary travel.	Yes, to location of scarce facility; triage via VC-MDTM.
Responsibility for care	Advice on diagnostic and treatment plan.	Advice on diagnostic and treatment plan.	Treatment and palliative care in region.	Palliative care in region.	Coordinating patient care in the region.	Coordinating patient care in the region.
Treatment coordination	Own patients and sometimes referral to scarce facility.	Own patients.	Own patients.	Specialised nurses provide care for own patients.	Own patients.	Refer patients to each other.
Frequency	Diverse (daily–monthly).	Monthly (1 study thrice per week).	Biweekly (4 studies weekly).	Weekly (1 study monthly).	Weekly (1 study monthly).	Weekly.

*The MDT specialists are more or less equivalent in terms of experience; detailed techniques may differ depending on experience or specialist preference.
†Medical oncologists and surgeons refer patients, if necessary, to each other after a VC-MDTM.
‡Outreach is the activity of providing services to any parts of the population that might not otherwise have access to those services.
MDT, multidisciplinary team; MDTM, multidisciplinary team meeting; VC, videoconferencing; VC-MDTM, videoconferenced multidisciplinary team meeting.

Table 2 MDT-Equal and MDTM-Collaborate: mapping of benefits and drawbacks

MDT-Equal and MDTM-Collaborate (n=13)	MDT-Equal (n=5)	MDTM-Collaborate (n=8)
Common benefits	**Benefits**	**Benefits**
► Multidisciplinary discussion (13).	► Complex case discussion, optimised treatment plans (5).	► Form a single MDTM to draw up treatment plan (8).
► Improved coordination of care (11).	► Recommendations with enhanced care coordination (3).	► Improved access to scarce facilities, enhanced coordination of care (8).
► Training on-the-job (5).	► Align protocols, peer review (2).	► Improved compliance to standards and guidelines (7).
► Less travel for MDs (6).		► Less travel for patients (2).
	► Insurance companies favour lower cost (1).	► Reduced cost for VC, less than FtF (3).
Common drawbacks with *solutions*	**Drawbacks with *solutions***	**Drawbacks with *solutions***
► Difficult getting information complete (9). ► *Format case presentations* (5).	► Additional VC increased workload (2). ► *Integrate VC in on-site MDTM.*	► Equipment flaws (3). ► *Technical support.*
► Administrative workload increased (5).	► VC less suitable for research (1).	► VC required attendance is troublesome (2).
► Costs/no reimbursement (3).	► Professional relationships decreased (1). ► *U-shaped table.*	► VC reduced confidentiality (1).

Between brackets: the number of studies reporting the benefit, drawback or solution; for some drawbacks solutions are profided in italic.
FtF, face-to-face (physically); MD, medical doctor; MDT, multidisciplinary team; MDTM, multidisciplinary team meeting; VC, videoconferencing.

in terms of preparing, making notes and taking additional actions (2 studies).[58 59] It was proposed to integrate the VC into the institutional MDTMs by standardising the meeting formats.[59] Professional relationships between members with different disciplines decreased, resulting in less sharing of uncertainties and less inclination to think of ways to collaborate for the benefit of the patient (1 study).[55] When the participants faced each other (across a U-shaped table) and after VC training, interaction between the different specialisms improved (1 study).[55] VC was considered less suitable for research discussions and for including patients in clinical trials (1 study).[56]

Benefits of MDTM-Collaborate

VC also helped specialists in oncology networks that required each other to bring together all the disciplines needed to draft diagnostic, or collaborate over, treatment plans to form a single MDTM. Using VC could help them plan with the patient and avoid unnecessary travel for patients (8 studies).[60–67] VC facilitated the access of patients from rural communities to scarce, urban facilities such as radiotherapy units (8 studies).[60–67] VC enhanced care coordination through case management that could identify the best treatment in a timely manner. VC enabled MDTs to meet national standards and guidelines when addressing rare tumours (7 studies)[60–66]; of these studies only three evaluated VC in relation to waiting times.[60 62 67] VC reduced travel for patients (2 studies).[61 67]

Drawbacks and solutions of MDTM-Collaborate

Equipment problems had occurred during project start-up but these were reduced by technical support (3 studies).[60 62 64] Ensuring the attendance of the mandatory specialisms required to fulfil guideline compliance was troublesome (2 studies).[64 67] Other drawbacks of VC were reduced confidentiality and not having the possibility to examine a patient. Privacy issues should be addressed in guidelines (1 study).[61]

DISCUSSION

We have provided an overview of current VC use by collaborating teams in oncology networks. Six different types of team collaborating through VC were distinguished in oncology care: Expert MDTM-National, Expert MDTM-International, Expert Consultation, Consultation Specialist-Nurse, MDT-Equal and MDTM-Collaborate. For the MDT-Equal type, VC constituted an additional MDTM held to discuss complex cases and provide optimised treatment for these patients. For the MDTM-Collaborate type, VC enabled specialists to form a single MDTM that included the complementary specialisms required to meet guidelines and resulted in their patients getting access to treatment in scarce facilities. For both types, the most important benefits were enhanced coordination of care and on-the-job training compared with

the situation with only face-to-face MDTMs at the collaborating locations or institutes.

Some of the benefits and drawbacks were not unique to the MDT-Equal or MDTM-Collaborate types; they were also reported in studies addressing the other four types. The sustainability of VC was determined by the way the different teams collaborated, how well they knew each other and how well VC was embedded in the organisation. The perceived benefits and the behaviour of members in overcoming barriers and finding solutions together were helpful in gaining VC acceptance. Some papers reported reduced efficiency,[55 57 58] although others reported more cases being discussed in a VC than a face-to-face MDTM due to more efficient discussions.[64 67] During VC meetings, behaviour tended to become more formal and the different disciplines would merely state their views, and not help each other to formulate an optimal treatment plan for the patient. This behaviour could result in using more time than necessary to discuss a patient. However, if the teams met each other physically at least once a year and received VC training, this would consolidate feelings of solidarity and the VC communication between the teams improved.[55 59 61 68 69] To summarise, a well-functioning MDTM, either by VC or face-to-face, requires the active participation of qualified and effective experts and optimised functioning in terms of format, structure, case selection and presentation, review, leadership and interaction between the participants.[70]

The benefits gained by discussing complex cases would be enhanced if the MDTs could choose which cases to focus on, but several European guidelines require all patients to be discussed in an MDTM,[58 59 62] whether it is through VC or face-to-face. There are also no standardised formats or guidelines worldwide for MDTMs, although some countries have evaluated and then standardised formats for MDTMs that include VC use.[3 71] These formats can, for instance, require completing an electronic form prior to the start of the MDTM that is then summarised at the start of the group discussion on a patient. Also clearly defined roles of participants of VC are important.[70]

This review showed that exploiting VC can lead to the better use of staff time compared with face-to-face meetings by reducing the time spent travelling, although some studies cautioned that VC preparation required additional extra time. Elsewhere, the costs of VC equipment and the lack of reimbursement mechanisms were an implementation barrier.[72] It was noted that insurance companies favour VC if it lowers costs.[58] Besides these costs, societal impact of improved health and well-being of patients in rural areas should also be taken into account.[65 73]

All over the world, collaborating teams in oncology networks now use VC to (1) bring evidence-based care to the best place for a patient to receive it; (2) discuss complex cases and rare tumours; (3) simultaneously and quickly inform and update all healthcare professionals involved in the treatment of an individual patient; and (4) share expertise to educate and provide on-the-job training. The role of opinion leaders was seen as important for the successful adoption of VC: ‘ To counter reservations on using VC meticulous planning and cultivation of support are key to gaining and sustaining provider acceptance’ .[60]

In one study it was concluded that a speed of at least 2 Mbps is needed to simultaneously stream video, see each other and ‘walk through’ CT or MRI images. It was seen as essential during complex case discussions to be able to see each other and at same time the detailed patient data in order to be able to diagnose a patient, evaluate the tumour stage and draw up an optimal multidisciplinary treatment plan.[59]

Most studies reported that participants would willingly replace face-to-face MDTMs with ones based on VC to discuss treatment plans for their patients if the benefits outweighed the drawbacks and the technology would deliver sufficient support at lower costs. However, as of 2018, only a minority of institutions in the USA had VC available (26%), although the majority would participate (57%) if it was available.[72] VC should be tailored to the local needs and the specific requirements for diagnosis and treatment, which depend on the biology of the tumour.[29 49]

Limitations

This review included a broad range of studies that used different research designs, settings and methods. Some studies were project set-up descriptions. Often, research methods were not well described. In fact, if we had excluded all the studies that did not follow guidelines for reporting research, we would have been left with very few studies to review. As such, the value of the included studies would have improved substantially if these guidelines had been followed.[13 74]

During the analysis of the data contained in the included studies, we saw that the methodology used in the studies and the description of results were often open to interpretation. Therefore two reviewers read all the studies in detail and extracted data in an iterative process. Thereafter, the information was mapped to provide an overview of benefits and drawbacks.

Recommendations

Based on the review of studies, we have formulated practical recommendations for the use of VC by collaborating teams, which we list in three categories.

Organisation of collaboration

- Create institutional commitment with local leadership, coordination and dedicated time for VC-MDTM members.[19 25 34 61]
- Meet in person at least annually to discuss policies, improve knowledge and to come to know and trust each other.[59 61]
- Evaluate VC-MDTMs with a focus on[58]:
  - Patient perspectives.
  - Strengthening the contributions of care personnel.

- Arrange the participation of qualified and effective experts.[58]
- Organise weekly meetings and use a premeeting checklist to minimise delays in starting treatment.[28]
- Organise administrative support so that physicians can concentrate on medical aspects and the number of cases to be discussed can be optimised.[57 58 60]
- Tailor the VC to local needs and disease-specific aspects including diagnosis and the treatment phase depending on the biology of the tumour.[29]

VC meeting logistics

- Run VC meetings within an established framework such as used with local MDTMs.[61]
- Ensure appropriate case selection ('admission rules').[48]
- Use a standardised format to present cases.[30 58]
- Minimise the impact on healthcare professionals' practices, minimise the workload in preparing for a VC meeting and respect traditional referral patterns.[61]

VC platform requirements

- VC platform with at least two cameras and microphones:
  - U-form seating plan so as to face each other.[55]
  - Bandwidth more than 2 Mbps.[59]
- An ability to see, at the same time, on two screens:
  - Participants for optimal personal interaction.[55]
  - Real-time actual data, such as imaging, histology and required test results to verify the diagnosis, tumour stage and treatment options.[58 59]

Further research

Future research on VC should include predesign and postdesign. Team collaboration over decision-making for treatment plans and care coordination should be compared in face-to-face and VC situations. The benefits and drawbacks should be assessed using well-defined quantitative and qualitative criteria.

COVID-19 pandemic

The data analysis phase of this review coincided with the start of the COVID-19 pandemic. To help bring this pandemic under control, VC was introduced as a communication medium in various domains to avoid contamination between participants. As a result, there is now a higher acceptance of VC as an alternative to face-to-face meetings. VC has enabled multidisciplinary discussions on treatment plans that otherwise would be difficult to continue.[75–79] Given this rapid implementation, it is important to not only understand the benefits, but also acknowledge the drawbacks, of VC.

CONCLUSIONS

VC enables sharing expertise for complex treatment or palliative care for specific tumours and to coordinate care for adults, adolescents and children.

Benefits for patients are less travel to obtain a treatment plan, better coordination of care, and improved access to scarce facilities and treatment in their own community. Benefits for healthcare professionals are optimised treatment plans for complex cases through multidisciplinary discussions and informing all healthcare professionals at the same time to enhance care coordination. VC also contributes to aligning protocols and continued medical education.

The costs of VC equipment and the lack of reimbursement were reported as an implementation barrier. Also the administrative workload increased because digital CT images had to be transmitted to a viewing station, which had to be planned and executed by all teams involved before a meeting.

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Author note Four authors are engaged with the University Medical Center Groningen (UMCG), which is developing patient-centred, integrated care pathways for various patient groups. The Quality and Patient Safety research group evaluates the implementation of care pathways and MDTMs in order to develop management-level indicators for the care pathways led by healthcare professionals. In addition to medical and logistic aspects, all laws and regulations concerning quality and patient safety have to be observed. The UMCG has an institutional ISO 9001 for Healthcare certificate and ISO 27001 Information Security certificate for their care, research and educational processes. LSvH works as a consultant on quality and patient safety for various care pathways seeking to implement improvements and is involved in the certification of these care pathways at the regional level. PD works as a researcher in the field of rehabilitation and is an epidemiologist. SvdW is a frequently asked information specialist at the university medical library (UML) and advocates open access publishing. She is an expert on literature searches (systematic reviews), search strategy development, critically appraised topics, evidence-based medicine, biomedical databases, impact, UML collection and is an educational coordinator. KA chairs the Health Services Management and Organisation Department of the Erasmus School of Health Policy & Management. His research interest is quality improvement and value-based healthcare. JR was chair of the multidisciplinary Head and Neck Oncology Group of the UMCG for 30 years and chair of the Dutch Multidisciplinary Head and Neck Oncology Group for 8 years. The centralisation of head and neck cancer care in eight centres was completed under his leadership in 1993.

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