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ORIGINAL ARTICLE

Web-based videoconferencing for rural palliative care consultation with elderly patients at home

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Abstract

Purpose Providing specialized palliative care support to elderly patients in rural areas can be challenging. The purpose of this study was to gain a preliminary understanding of the experience of using mobile web-based videoconferencing (WBVC) for conducting in-home palliative care consults with elderly rural patients with life-limiting illness.

Methods This was a descriptive, exploratory, proof-of-concept study with a convenience sample of 10 WBVC visits. A palliative care clinical nurse specialist (PC-CNS), in the home with the patient/family and home care nurse (HC-N), used a laptop computer with webcam and speakerphone to connect to a distant palliative care physician consultant (PC-MD) over a secure Internet connection. Data was collected using questionnaires, interviews, and focus groups.

Results Analysis of qualitative data revealed four themes: communication, logistics, technical issues, and trust. Participants reported they were comfortable discussing concerns by WBVC and felt it was an acceptable and convenient way to address needs. Audiovisual quality was not ideal but was adequate for communication. Use of WBVC improved access and saved time and travel. Fears were expressed about lack of security of information transmitted over the Internet.

Conclusions Using WBVC for in-home palliative care consults could be an acceptable, effective, feasible, and efficient way to provide timely support to elderly rural patients and their families. Having a health care provider in the home during the WBVC is beneficial. WBVC visits have advantages over telephone calls, but limitations compared to in-person visits, suggesting they be an alternative but not replacement for in-person consultations.

Keywords Palliative care consultation · Home care · Telehealth · Videoconference · Rural · Elderly

Introduction

Most palliative care (PC) patients prefer to be cared for at home, until death if possible [1]. To facilitate this preference, family physicians and home care teams may need support from specialized PC consultants to manage complex issues as patients near end of life [2, 3]. In rural and remote areas, access to this support can be limited, negatively impacting patient and family quality of life [3–5]. Traveling to a specialist visit can cause physical, psychological, and financial stress for seriously ill rural patients, even more so when they are elderly and nearing end of life [6–8]. Barriers of time, distance, and weather can preclude timely in-person home visits by PC consultants in rural settings [2, 3, 9, 10]. Access is also impeded by the increasing demand for PC consultation as the aging population grows and as a palliative approach to care is integrated earlier in both cancer and non-cancer disease trajectories [11]. Telehealth, specifically mobile web-based videoconferencing (WBVC), is an approach for conducting in-home PC consults with elderly rural clients that warrants further study.

Telehealth, the use of information and communication technologies to provide clinical support to individuals separated geographically, has the potential to expedite access to care and facilitate "healing at a distance" [12]. In rural and remote communities, where distances can be vast and lack of health services can contribute to poorer health outcomes [13],

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telehealth has become an important tool for enhancing health care service delivery [7, 8, 14, 15]. The use of telehealth for virtual visits, that is, audiovisual interactions between patients and health care providers (HCPs) in real time, is becoming more mainstream and is showing promising results [16].

Telehealth technology in rural facilities is increasingly and effectively used to conduct video consultations with distant specialists [15, 16], including limited use for PC consultation [2, 17]. This virtual visit format reduces the burden and cost of travel for patients and families [7, 18]. However, it still requires them to travel to the nearest telehealth-equipped rural facility, which can be difficult for those who are seriously ill, frail, or elderly. Using mobile WBVC technology to conduct virtual visits with PC patients at home eliminates the burden of travel, thereby improving comfort, convenience, and access to care for the patient and family, [19] while decreasing expenses [20] and saving time [10, 21] for HCPs.

Evidence suggests that virtual home visits with PC patients do not compromise the quality of care [22], may be as effective as in-person visits [23], and may enable better assessment [10, 21] and communication [24] than would be possible through a telephone call. Use of WBVC for our population of interest, however, has potential challenges with respect to feasibility. Specifically, elderly clients with life-limiting illness, along with possible cognitive, auditory, or visual impairment, may be uncomfortable using the technology, [25–27] especially if they must manage it on their own [28, 29]. In addition, technology may not function smoothly in rural areas with poor Internet connectivity [3, 23, 30], despite advancements in recent years.

Studies on the use of videoconferencing to conduct virtual home visits with PC patients are increasing and were recently reviewed [19, 31]. Almost all published studies, however, have been limited to visits conducted by the primary nurse in a generalist or palliative home care program. There is a lack of research focusing on the use of this technology for in-home PC video consultation and none that specifically involve elderly patients in rural areas. A thorough literature search revealed only the following studies on virtual home visits by PC consultants: (1) a case report of a supportive care nurse practitioner conducting video consultations with a complex 33-year-old man and his parents in their New York apartment [32]; (2) multiple reports on the use of home telemedicine by a pediatric palliative care service in Brisbane, Australia [9, 33, 34]; and (3) a further Australian study trialing the use of in-home videophones to connect remote generalist nurses and patients with distant palliative care outreach nurses [10]. While not focusing on our population of interest, these studies suggest that the use of telemedicine for the delivery of specialized palliative care support in the home is feasible, acceptable, and valuable.

This pilot study adds to the limited evidence on the use of mobile WBVC for palliative care consultation with patients at home—with a specific focus on an elderly rural population. The aim of the study was to gain a better understanding of participants' experience with WBVC with regard to the clinical effectiveness, acceptability, service impact, and technical feasibility of this innovative consultation format.

Methods

Setting and context

This study was conducted in 2015 in the rural area of the Calgary Zone (CZ) of Alberta Health Services (AHS) with patients referred to the rural palliative care consultation team (RPCCT). The CZ rural area extends approximately 100 km in all directions from the city limits of Calgary, Alberta [2], and is home to approximately 350,000 people. The RPCCT is comprised of physician consultants (PC-MDs) and clinical nurse specialists (PC-CNSs) who provide secondary level clinical support to rural generalist primary HCPs in all care settings. Patients of all diagnoses and ages are seen in consultation by the RPCCT, with most patients (almost 70%) being elderly (age 65 or older) [2].

The majority of consults by the RPCCT (approximately 75%) take place in patients' homes [2]. Outside of this study, the standard format for initial palliative care in-home consultation was an in-person home visit with the patient and family by a PC-MD or PC-CNS, along with the patient's home care nurse (HC-N). Laptop computers were used to look up medical information and chart online. If needed, the PC-MD or CNS phoned another RPCCT member after the visit to confirm a plan for care before communicating findings and recommendations to the patient's physician and other health care team members. Follow-up consults were conducted in person or by telephone.

Sample

It was determined a priori that participants at 10 WBVC visits would comprise the convenience sample for this pilot study, including RPCCT members, patients, families, and HC-Ns. Prospective patients were identified, approached, and recruited through screening of initial or follow-up consult requests received by the RPCCT. Eligible patients were those meeting criteria for PC consultation, aged 65 or older, English-speaking, living at home in a distant community, and willing and able to participate in study activities. It was recognized that patients with profound cognitive impairment, agitation, or delirium may be distressed by the WBVC encounter and therefore would not be appropriate to include. Only one eligible patient/family declined to participate. After each patient agreed to take part, family members and HC-Ns who planned to be present for the home visit were approached regarding study enrollment. Written informed consent was obtained

from all participants. The 10 WBVC visits in this study were conducted between June and November 2015.

Study design

This was a descriptive, preliminary study piloting the use of mobile WBVC to connect rural elderly patients to distant PC-MDs from their homes. Prior to participant recruitment, RPCCT members received updated WBVC equipment and training in the use of the technology by AHS Information Technology (IT) personnel. Previous use of the videoconferencing software for online meetings facilitated rapid learning. IT personnel provided real-time technical support for the duration of the project.

WBVC with the PC-MD replaced the standard PC-MD in-person format for initial palliative care in-home consultation. A PC-CNS and HC-N traveled to the home, managed the technology, supported the patient, and relayed assessment findings to the PC-MD over the WBVC. The PC-CNS used an AHS laptop to establish a secure, encrypted Internet connection to the distant PC-MD through the wireless network in the patient's home or through a cellular network, using the computer's aircard. The computer was equipped with Microsoft Lync® videoconferencing software (now rebranded Skype for Business® Microsoft Office), speakerphone, and an external webcam that could be directed at the person speaking or at body parts that required closer inspection.

Data collection

Information recorded about each WBVC visit included set-up time, visit duration, location, participants, patient demographics, reason for consult, type of consult (initial or follow-up), and travel distance and time saved for the patient and PC-MD. All participants were asked to complete a questionnaire where they rated their WBVC experience on a 5-point Likert scale and rated audiovisual quality.

After each WBVC, all patients and family members were invited to participate in semi-structured interviews (telephone or in-person) and all RPCCT members and HC-Ns were invited to participate in a focus group, to reflect and comment on their experience using WBVC. To enhance the trustworthiness of qualitative findings, interviews and focus groups were conducted by an objective facilitator using consistent guided questions, and were audio-recorded and transcribed verbatim. All identifying information in the transcripts was modified or removed. Qualitative data was also collected from open-ended questions on questionnaires.

Data analysis

SPSS was used to calculate descriptive statistics such as means and percentages. Qualitative data were analyzed in an iterative process using content analysis methods [35] and interpretive description [36]. Five members of the research team (RS, LRP, CS, MW, GH) independently labeled transcripts from the initial 6 WBVC visits with descriptive codes that represented common concepts and then grouped these codes into a smaller number of overarching, unifying themes. Consensus on initial codes and themes was reached at a meeting of these team members. Using NVivo software, the research assistant (RA; CS) then applied these codes and themes to all study transcripts, added new codes as needed, and categorized the data by theme. Next, the categorized data were reviewed independently by two researchers (RS and LRP) and final consensus on a modified categorization scheme was achieved at a meeting of these two researchers and the RA. The RA subsequently recoded all transcripts with the revised coding scheme, and the accuracy of the coding was validated by one researcher (RS).

Results

Ten WBVC visits were conducted in this study, half for initial PC consults and half for follow-up visits, with an average visit length of just over 1 h (Table 1). A total of 37 participants included 10 patients, 13 family members, 9 HC-Ns, 3 PC-CNSs, and 2 PC-MDs. Eight of the 10 patients had cancer, the mean patient age was 77, and the median Palliative Performance Scale [37, 38] was 50% (range 30–100%).

Rates of questionnaire completion were consistently high (at least 89%) across all participant types. The vast majority of patients, family members, and HCPs reported they could communicate effectively and felt comfortable discussing concerns by WBVC and most felt that patient/family needs were addressed by WBVC as well as they would have been in person (Fig. 1). For 9 of the 10 WBVC visits, all involved HCPs agreed that WBVC improved clinical decision-making

Table 1 WBVC: implications for time and travel

Time and travel saved by WBVC home visit[a]	
Palliative physician (compared to in-person home visit)	
Mean travel time saved (range)	1.5 (0.6–2.2) h
Mean travel distance saved (range)	110.7 (38.6–176.8) km
Patient/family (compared to travel to nearest facility)	
Mean travel time saved (range)	0.4 (0.1–1.3) h
Mean travel distance saved (range)	22.3 (2.2–100.0) km
Mean days seen earlier by physician (range)	3.25 (0.2–6) days
Mean length of WBVC visit (range)	69 (45–105) min
Mean added time for WBVC set up (range)[b]	23.7 (5.0–38.0) min

[a] Reflects 2-way travel

[b] Includes time for explaining study and obtaining informed consent

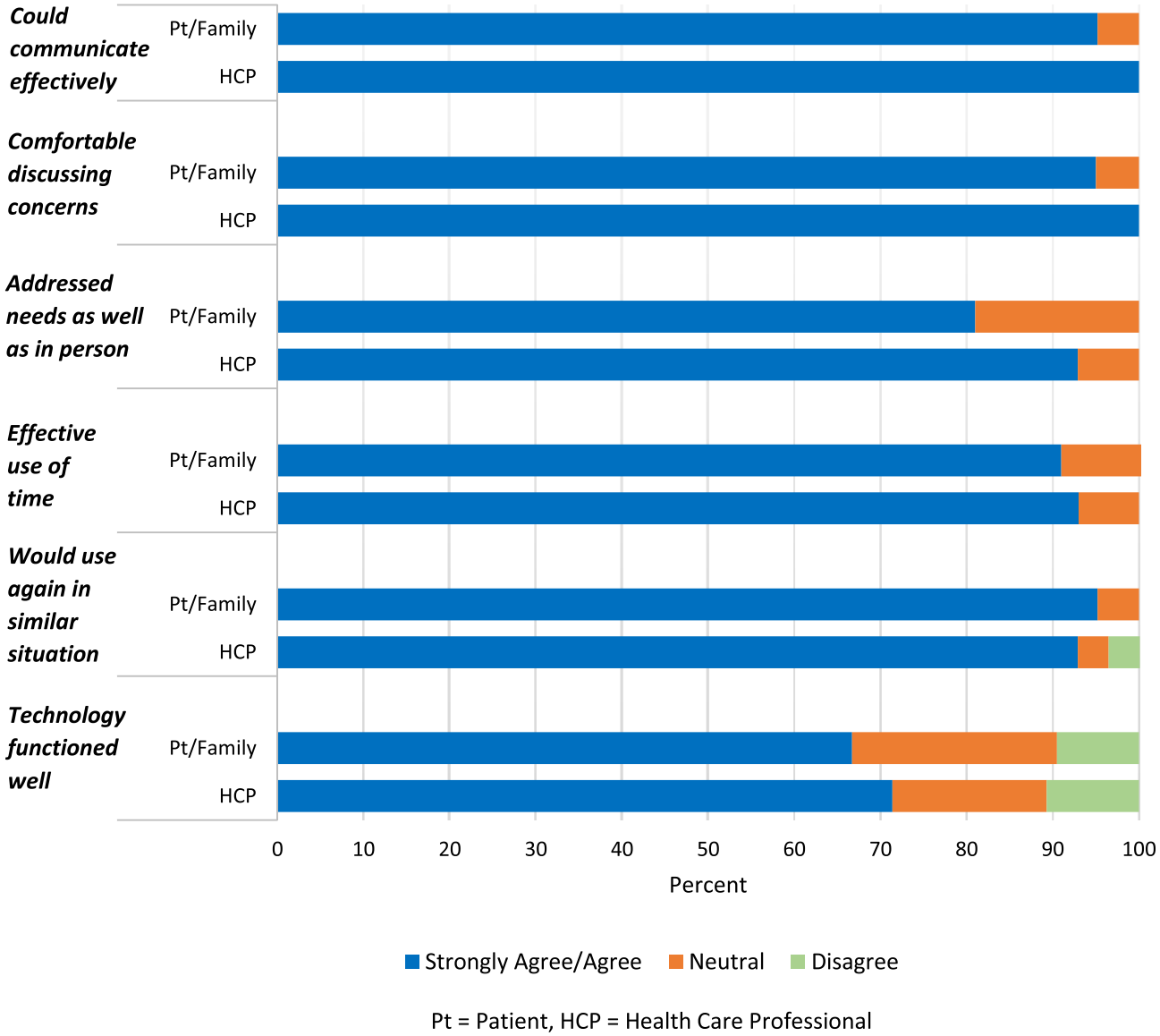

Fig. 1 Questionnaire responses

beyond reviewing the case with the distant consultant by phone. WBVC visits enabled quicker time to consultation, increased visit time for set up of technology, and resulted in savings of time and travel for PC-MDs, patients and families, in comparison to in-person visits (Table 1).

Rates of interview/focus group participation were variable by participant type: 100% of RPCCT members, 89% of HCNs, 80% of patients, and 69% of family members. Analysis of qualitative data revealed four themes, each encompassing multiple codes (Table 2). The theme of *communication* included remarks on how the WBVC impacted conversation, compared to other visit formats, and enabled non-verbal communication. It also contained comments on the outcomes of the communication and who should participate. The theme of *logistics* encompassed comments on the benefits of travel avoidance, cost savings, and improved access. It also included remarks about the challenges of clinical assessment by WBVC, albeit improvements compared to a telephone call, and impact on visit length. The theme of *technical issues* captured concerns about poor sound and picture quality, problems with the Internet connection, and the burdens of set up and troubleshooting. The final theme of *trust* included concerns of patients and family members about Internet security and the identity of the distant consultant.

Discussion

In this preliminary study, experiences with the use of mobile WBVC technology by HCPs to connect elderly patients and

Table 2 Qualitative themes, codes, and quotes

Theme: communication	
Codes	Quotes
Impact of technology on communication • Comfort • Personal connection • Topics covered • Openness/honesty • Flow of conversation	"I found that the conversation was really not a whole lot different than if I had been face-to-face in the patient's living room." (HCP) "Well I felt like she [physician] was very, very present and…it was much more personal for us… not as the patient but as a … concerned family member …. I felt like we were more engaged than… if we were all just sitting in the room." (F) "I was impressed with…how open people were with asking questions with like how am I going to die and how quickly and how do I explain this to my husband and what's coming down the road…you know very sensitive topics." (HCP) "I found it mixed with the patients and families and the age differences in understanding the technology." (HCP) "You could ask her any questions that you needed to know and stuff like that…so I thought that was good." (P) "I would presume to give any kind of diagnosis through a webcam would be quite difficult." (P) "I cannot really have a full conversation about goals of care that I would in person just because of the number of pauses." (HCP) "You know she can see you, creates an air of honesty." (P) "For the first 45 min, I felt the family were feeling a little…uncomfortable with sharing um and I suspect that had there been a round table where everyone was involved in person it may have flowed a lot easier, more quickly." (HCP)
Comparison to other methods • WBVC compared to face-to-face, telephone, traditional videoconferencing	"Nice to be able to see the doctor as opposed to just a straight phone call." (P) "It's like talking on Skype only this was much better." (F) "It's never quite the same as talking face-to-face but, um, it sure is the next best thing." (F) "Still a lot better than a phone summary." (HCP)
Non-verbal • Benefits/challenges seeing visual cues to facilitate communication	"At least Dr. ___ got to see uh non-verbal cues." (HCP) "I think the doctor was able to get a feel for the client…and in this case there were family members." (F) "I liked that she was able to engage and see the responses." (F) "It helps to establish rapport I think more so than… a telephone consultation." (HCP)
Outcomes • Outcomes of WBVC whole team communication for patient/family and HCPs	"I think it enhanced continuity of care in a pretty seamless fashion because all of the clinicians were hearing first-hand what the patient had to say at the same time." (HCP) "This was much more comprehensive [than a telephone call] because they [physicians] actually heard it straight from the patient and visualized the patient so I felt much more comfortable making those recommendations." (HCP) "I think it gives some insight to some people …If…they are going to use that [WBVC] to help people make diagnoses or to help them with their problems when they are in a rural community…where they cannot touch base, I think that's awesome." (P)
People to include • Health care team • Family members • Optimal number of people	"You can have all of the team participate." (F) "It's nice when possible to have a staff member in the home. I think it further helps with the rapport and putting the family at ease and um then if there's any clarification needed after the consult or any um extra teaching that needs to be done then the home care staff is there to … help that along." (HCP) "I liked it that the family was able to be there to speak with the doctor as well as the home care folks." (F) "It was uh ... well it was uh…quite…intimidating in that there were so many people around and I prefer talking on a one-to-one basis ... but at the end of the conference it was really worthwhile." (P)
Theme: logistics	
Codes	Quotes
Less burden • Comfort with own environment • Easy/convenient • Risk avoidance • Travel avoidance and cost savings for patient/family and HCP	"Well I liked that you were in your own home base … and you know … you could sort of relax." (P) "In your own home it's so much more convenient." (P) "If you do not have transportation, then you are not stuck." (P) "Folks certainly appreciate the comfort aspect of not having to leave their home, of not having to sit in a doctor's office, of not having to travel … of not having to go out in cold weather." (HCP) "When someone's that sick and to have to take them out for possibly an hour, hour and a half drive into the city, you know? That's, uh, it's quite a drain. I mean literally he could pass away from the strain." (F)

Table 2 (continued)

Access	"Well you know there's absolutely no way we could have gotten him to a doctor." (F)
• Challenges with mobility and physician office access	"Being able to reach more people in rural areas." (P)
• Improved access to medical assessment	"I think potentially getting the physician there quicker than we might normally be able to depending on the client's situation." (HCP)
• Timely visit	"It could be done on short notice." (P)
• Decreased wait time	"She [physician] could be with more patients in a day without driving around." (P)
	"It hastened his care too like it helped to facilitate his change of meds and the speed at which we were able to get them." (F)
Clinical assessment	"If you really needed her to say feel like a lump or something like that she would not be able to with this technology." (P)
• Limited ability to perform complete clinical assessments	"Well certainly there's a disadvantage where physical symptoms still need to be relayed by a nursing assessment ….We did not use the technology in this study to actually listen to the chest,…the heart, or… the abdomen or we did makeshift things to look at rashes, spots, swelling but it may not have been ideal." (HCP)
• Benefits of visualization for assessment	"I had an issue trusting the camera.…I liked the other nurse being there to describe it to the doctor." (F)
	"With our patient with edema… you could not actually feel it but they could see what we are talking about a little bit rather than just hearing about it." (HCP)
	"When the doctor is looking at the patient, it's often much easier to come to a diagnosis." (HCP)
Length of visit	"I was able to sit there and…went through the whole thing so it was a long process that—it was like 3 h and um I survived it quite well and I uh … I was tired when I was finished." (P)
• Benefits and challenges of length of visit from patient, family and HCP perspective	"It shortens the visit too a little like you can get it dragging on and…telling stories when you are in a doctor's office … and this you know you get to the point." (F)
	"The physician…definitely spent more time participating in the videoconference than they would have with the phone call with the CNS." (HCP)
Theme: technical issues	
Codes	Quotes
Audio/visual quality and connection	"It would be nice if they could make it run all smooth." (P)
• Loss or poor quality of audio or video	"There was an echo in the background when she was talking." (P)
• Difficulty connecting to the Internet	"When it was working well it was great but yeah when there were those pauses or the lags it was frustrating because you had to backtrack or repeat yourself." (HCP)
• Webcam limitations	"Say if the patient was saying something and they wanted to see the husband's reaction… they could not visualize everybody in the room sometimes." (HCP)
Set-up	"It just took a while to set up." (F)
• Added time to set up and troubleshoot WBVC equipment	"You have to spend all that time getting it all set up and making sure the technology works when really you just want to start talking about the issues.… There was that … distraction from what you are actually doing there." (HCP)
• Finding optimal set up location	"I had to switch locations if the sun was coming through the window." (HCP)
Theme: trust	
Codes	Quotes
Internet security and/or privacy	"You know? Because you do not just 100% trust the Internet." (P)
• Concerns about online security	"These days everybody's hacking into something, you know?" (P)
	"No, I do not feel like there was a concern for privacy." (F)
	"She was worried that something was going to get posted onto the Internet for everyone to see so once we explained … that it was like talking on Skype or like talking on the phone ... she understood." (F)
Physician identity	"There should be more light on her so I know who I am talking to." (P)
• Patient/family uncertainty about identity of person on the screen	"You know I think we need to be cautious to bring in those NOD [name, occupation, duties] issues with this because the patient may have difficulty remembering or focusing if from the beginning of a videoconference to the end, the patient forgets who that person is on the screen." (HCP)

P patient, *F* family, *HCP* health care provider

their family members to distant PC experts from their rural homes were mostly positive. Findings suggest promising potential for the clinical effectiveness, acceptability, service impact, and technical feasibility of this innovative technology for this population.

Clinical effectiveness

Findings of this pilot study suggest that PC consultants can effectively conduct thorough palliative care visits from a distance using WBVC—despite potential barriers posed by

patients being elderly and living rurally. PC-MDs established a personal connection with patients and families and discussed the same sensitive issues that would have been addressed in an in-person consultation:

> I was impressed with … how open people were with asking questions like how am I going to die and how quickly and how do I explain this to my husband and what's coming down the road … you know very sensitive topics. (HCP)

As found in other studies [10, 15, 16, 21, 24], the visual component of the WBVC facilitated improved interpersonal connection and patient assessment than would be possible by telephone. Using a WBVC model with HCPs in the home further enhanced clinical effectiveness by allowing for hands-on assessment and in-person support. Similar advantages of the HCP presence with the patient were noted in studies of facility-based video consultations [15–17, 27].

The WBVC model used in this study also enabled real-time communication between multiple participants, improving team decision-making and care planning:

> I think it enhanced continuity of care in a pretty seamless fashion because all of the clinicians were hearing firsthand what the patient had to say at the same time. (HCP)

Inclusion of the HC-N permitted the secondary-level consultant to provide support and education to *both* the primary care provider and the patient and family, thus empowering the HC-N to coordinate the plan going forward, a benefit identified by others [9]. It also reduced the risk of "sealing out" local primary providers and establishing a direct and preferential relationship between the patient and specialist, a potential pitfall of less-inclusive models noted in the literature [39].

Acceptability

Results from this study imply that WBVC could be an acceptable format for palliative care consultation. Patients and families indicated they could communicate effectively, were comfortable discussing concerns, and had their needs met by WBVC; they appreciated seeing the PC-MD instead of talking on the phone; and they were grateful for the convenience of staying home and avoiding the burdens and risks of travel:

> In your own home it's so much more convenient. (Patient)

This is in keeping with other published findings [5, 25, 34].

In many home telehealth studies, PC patients and their caregivers were required to manage the videoconferencing technology themselves [22, 23, 25, 31, 33], which can be burdensome and overwhelming. In effect, the responsibility and workload from the system was transferred onto the patient and family [40]. In contrast, the burden for patients and families in this study was minimized by having the PC-CNS manage the WBVC technology and take it from the home at the end of the visit. This also avoided the financial burden of providing patients with technology and the logistical challenges of loaning and recovering equipment.

Lack of trust was an unexpected finding of this study that impacted acceptability:

> These days everybody's hacking into something, you know? (Patient)

Some patients and families expressed lack of trust in the privacy and security of the Internet connection and the identity of the distant PC-MD. Privacy concerns were expressed despite verbal and written assurance that WBVCs were not recorded and all audio and visual information was automatically encrypted during transmission. Similarly, participants in an Australian study [41] needed reassurance that the videoconference was not being recorded. Others have also noted that privacy, security, and confidentiality of information is an ethical consideration for the utilization of telehealth technologies, and patients could misperceive the possibility of privacy violation during a videoconference [8, 42]. In light of these patient and family concerns, it is recommended that distant consultants (1) be very intentional about providing a clear explanation of the security features of the Internet connection, (2) ensure good facial lighting, (3) wear a visible name tag, and (4) start the consult with a comprehensive introduction, including name, occupation, duties, and current private location.

Service impact

Conducting rural PC consults by WBVC, instead of in-person, saved the time and cost of travel for consultants. These savings could enable consultants to see more patients in a day, improving patient access and health system efficiency, an observation mirrored by others [30, 34]. Cost savings, however, should not be used to rationalize replacing all in-person visits with WBVC visits and decreasing investment in local rural services. Rather than reducing existing rural-urban inequities, conducting all consults by WBVC could deepen the divide by depriving rural patients of access to "real doctors," in-person care, and the human touch available to their urban counterparts [39, 40, 42].

Technical feasibility

Although participants found they could communicate effectively by WBVC, connection problems were encountered in our rural Alberta study area:

> When it was working well it was great but yeah when there were those pauses or the lags it was frustrating because you had to backtrack or repeat yourself. (HCP)

It is well-established that user-friendly, easily accessible, reliable technology [7, 28–30, 43], and adequate user training [7, 23, 29] are critical to the success of telehealth initiatives. It is also well known that connection issues are prevalent in rural and remote locations and can hamper success [3, 23, 30]. Here, standardization of WBVC equipment and software helped avoid issues with incompatible or outdated technologies and technical training and support facilitated user comfort.

Several tips to improve audiovisual quality and reduce communication disruption were discovered during the study:

1. Connect to the Internet using an in-home wired or wireless network rather than a cellular network, especially in more remote locations.
2. Close all computer programs except the videoconferencing software.
3. Ensure cellphones and pagers are not placed next to the speakerphone.
4. If connection issues persist, turn off the video feed from the distant consultant to preserve the patient video feed.
5. As a last resort, mute all WBVC audio and use telephones for audio (set to speakerphone in the home) to preserve the video feed.
6. Create a WBVC troubleshooting guide.
7. In light of the time-consuming technical aspects of a WBVC visit, create and follow a focused agenda.

Implications for practice

While offering advantages over a telephone call, participants reported that WBVC PC consult visits were not as good as in-person visits:

> It's never quite the same as talking face-to-face. (Family)

Video-based assessments will never be as comprehensive as those performed in-person, not all patients will be comfortable with or appropriate for a WBVC visit [5, 43–45], and technology will not always function well enough to enable this type of interaction. In addition, the importance of human touch by the palliative consultant, particularly for dying patients and their family members, must not be overlooked [5, 21, 26, 42]. Hence, in keeping with other studies [5, 34, 42], these findings suggest that WBVC PC consult visits should not replace all in-person visits. Rather, WBVC should be an optional alternative or complementary visit format when an in-person visit is not feasible. Further, as recognized by others [2, 10, 27, 43–45], WBVC may be more appropriate for follow-up visits than initial visits, so that an in-person relationship is established prior to the WBVC interaction taking place. Findings of this study also imply that having a primary HCP (e.g., HC-N) in the home with the patient and family is the optimal WBVC specialist consultation model.

Conclusion

This was a preliminary study intended to explore the experiences of a small cohort of elderly patients, their family members, and HCPs in using WBVC for PC consults in one rural area of southern Alberta. Experiences may vary with different rural geographies, age groups, and available Internet connectivity. Results from this study suggest that mobile WBVC could be a feasible, acceptable, and effective way to provide timely PC consultation to patients and families in their homes, despite the challenges posed by advanced age, frailty, and rurality. We found that having a HCP in the home facilitated clinical examination and in-person support, removed the burden of technology from the patient and family, and reinforced primary and secondary provider roles. At times, audiovisual quality was not ideal. However, it was adequate to enable communication and afforded improved patient assessment and interpersonal connection than possible through a telephone conversation. Using WBVC reduced the burden and expense of travel for patients, families, and consultants, and increased consultants' efficiency and productivity.

We believe this technology shows promise to support PC patients in their homes. Areas for further study include:

1. Use of WBVC to connect PC patients and families with nurses, family physicians, and other medical specialists.
2. Use of peripheral devices, such as a digital stethoscope, to augment clinical assessment over WBVC.
3. Determination of factors impacting patient appropriateness for and acceptance of WBVC, including the patient's clinical condition and previous experience with technology.
4. Thorough analysis of costs of WBVC for PC consults.

Future studies with a larger sample size could help determine the generalizability of these results to a diverse palliative population and better understand the broader acceptability/feasibility of the use of this technology.

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Compliance with ethical standards

Ethical approval This study was approved by the Calgary Conjoint Health Research Ethics Board (Ethics ID# REB15-0429). Written informed consent was obtained from all individual participants included in the study, and they were able to withdraw from the study at any time.

Conflict of interest The authors declare that they have no competing interests.

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