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## **Patients' perspectives on video consultation for non-communicable diseases: qualitative study in Singapore**

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### **Author contributions:**

The research team included four family physicians and two medical students. The family physicians managed patients with NCD in polyclinics, via face-to-face and video consultations. They were not involved in the care of the participants of this study.

MST: conceptualization, methodology, funding application, data gathering and analysis, manuscript draft preparation, reviewing, editing and journal submission.

NCT: conceptualization, methodology, supervision, data analysis, reviewing, editing and finalizing the manuscript.

GCKY: conceptualization, methodology, data analysis, reviewing, editing and finalizing the manuscript.

RJKF, NKC, HS: data gathering and analysis, review of manuscript.

All authors read and approved the final manuscript.

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## **ABSTRACT**

### **Background**

Telemedicine is increasingly used to provide primary care services amidst the COVID-19 pandemic. Understanding patients' perspectives on telemedicine is pivotal for its wider adoption in managing non-communicable diseases (NCD) in the community.

### **Aim**

This study explores the views and concerns of patients who have yet to use video consultation (VC) for NCD management in Singapore.

### **Design and Setting**

This qualitative study was conducted in a Singapore primary care clinic.

### **Method**

16 patients with type-2 diabetes mellitus (T2DM) and/or hypertension and/or hyperlipidaemia without prior VC experience participated in individual in-depth interviews in this study. They were purposively enrolled in the polyclinic. Audited transcripts were independently coded by two investigators. Thematic analysis was performed to identify perspectives on telemedicine based on the health, information, and technology zones of the Health Information Technology Acceptance Model (HITAM).

### **Results**

Three themes emerged: perceived benefits of VC utility, perceived barriers towards VC adoption, and potential challenges of VC. Participants viewed VC as safe and convenient if they had stable NCD. They voiced concerns on possible suboptimal care due to the absence of physical examination, network connectivity, and personal medical data security. Participants highlighted challenges of VC uptake such as digital health familiarity, availability of their own mobile and telemonitoring devices, and healthcare costs consideration.

### **Conclusion**

Addressing the concerns and challenges highlighted by non-VC users can help physicians and policy-makers explore ways to scale up telemedicine in Singapore. A hybrid clinical care model comprising in-person visits and VC may be the way forward for NCD management.

(250 words)

### **KEYWORDS**

Health information technology acceptance model, non-communicable diseases, primary care, telemedicine, video consultation

### **HOW THIS FITS IN**

Non-VC users viewed VC as safe and convenient if they had stable NCD. They voiced concerns on possible suboptimal care due to the absence of physical examination. Combining in-person visits and teleconsultation may be a desirable hybrid care model.

## INTRODUCTION

Telemedicine is the systemic provision of healthcare services via Information and Communications Technology, covering tele-treatment, tele-monitoring, and tele-support.<sup>[1]</sup>

Teleconsultation is increasingly adopted to provide chronic, primary and specialty care during the COVID-19 pandemic.<sup>[2]</sup> Teleconsultation converts a face-to-face interaction between doctors and patients to a virtual consultation, through a phone call or video call. Patients can remain in the comfort of their homes for review of their medical problems.

Telemedicine is set to become a key feature of Singapore's healthcare landscape with an ageing population,<sup>[3,4]</sup> in order to cope with the expected rise in the number of patients with non-communicable diseases (NCD) such as type-2 diabetes mellitus (T2DM). Singapore's Ministry of Health (MOH) has set up National Telemedicine Guidelines and an online course to guide doctors on telemedicine services.<sup>[3]</sup> Local primary care clinics have introduced teleconsultations to patients.<sup>[5]</sup>

International studies have provided perspectives on the utility and delivery of telemedicine.<sup>[6-11]</sup> About three-quarters of South Korean patients preferred teleconsultation, and their acceptance of teleconsultation varied according to age, education, and income.<sup>[6]</sup> However, they were concerned about reliability, cost and technical difficulties. In another American study,<sup>[7]</sup> patients cited convenience, privacy and comfort as important considerations.

Video consultations are considered superior to telephone consultations. In a British qualitative study in primary care, video consultations provided better visual cues, rapport and communication.<sup>[8]</sup> These visual cues allowed for a formal and focused consultation. However, if physical examinations were necessary, patients preferred face-to-face consultations.<sup>[12]</sup>

Video consultation (VC) conducted via Zoom Video Communications<sup>[13]</sup> was introduced in Singapore in mid-2020, for patients with stable NCD.<sup>[14]</sup> The preference, acceptance and concerns of local patients towards teleconsultation is unknown. A survey on patients with NCD showed that only half of them were willing to use telemonitoring, which complement telemedicine.<sup>[15]</sup> Factors affecting their willingness included technological literacy, beliefs and previous technology utility.

As VC is relatively new to the local population, future expansion of the service will require knowledge of how receptive patients are towards VC, especially for those who have not adopted VC. This study aims to explore the views and concerns of multi-ethnic Asian patients with T2DM and/or hypertension and/or hyperlipidaemia, who are non-users of VC, towards VC for NCD management in primary care.

## **METHODS**

### **Study design**

This study employed qualitative research method in which individual in-depth interviews (IDI) were organised to understand participants' subjective and multi-dimensional views and concerns towards VC, aided by a video and interview guide.

### **Conceptual framework**

A conceptual framework helps to piece together the multi-dimensional perspectives of a topic to facilitate understanding of their inter-relationship. Such a framework supports the design of the interview guide in this study (**Supplementary Appendix**). The Health Information

Technology Acceptance Model (HITAM)<sup>[16]</sup> assessed consumers' acceptance of technology implementation in healthcare, and was developed as an extension of the Technology Acceptance Model and the Health Belief Model. Validated in South Korea to describe health consumers' behavioural intention, the framework categorised factors into "health", "information" and "technology" zones. The health information technology (HIT) of interest in this study was VC. The framework was selected to focus on a tech-enabled modality of telemedicine delivery and utility. It includes the (1)health zone on views about participants' health status, beliefs and concerns; (2)information zone on normative beliefs; and (3)technology zone on HIT reliability and self-efficacy.

#### **Study site and Period of study**

SingHealth Polyclinics (SHP) is a public primary care institution with nine polyclinics serving over 1.3 million residents in Singapore. This study was conducted from March to August 2021 in Sengkang Polyclinic, located in north-east Singapore, which managed over 900 patients daily, including those with NCD.

#### **Study population**

The target participants were patients on follow-up at the polyclinic for T2DM and/or hypertension and/or hyperlipidaemia, and non-users of VC at the point of recruitment. They included Asian adults aged 21 years and older, of any gender or ethnicity, and were able to understand and communicate in English. Those with any disability that rendered them unable to provide informed written consent or unable to speak or understand English were excluded.

#### **Recruitment**

Potential participants were invited in-person during their clinic visit, and the reasons for doing the study were explained to them. Participation was voluntary without any impact on their care. Purposive sampling was conducted to include participants of different ages and education. Their demographic profiles were postulated to influence their views on VC. Informed written consent was obtained from all participants before the interview in a private room.

### **Interviews and transcribing**

The participants underwent one-to-one interviews conducted by the lead investigator, a family physician trained in qualitative research. The interviews were organised individually at the study site for participants to share their personal views of VC frankly. Demographic data was collated using the participant demographics questionnaire. A video demonstrating VC in primary care was shown to participants, followed by a semi-structured interview aided by the topic guide. Interview notes were taken. All participants were reimbursed with grocery store vouchers of SGD20 (estimated USD15) as tokens of appreciation for their time. The interviews were audio-recorded and transcribed verbatim by a professional transcriber. The study team members audited the transcripts against the recordings to ensure accuracy.

### **Coding and analysis**

Data was analysed according to thematic analysis,<sup>[17]</sup> and executed iteratively after each interview. Two investigators read the full transcripts independently to generate initial ideas, before deriving an initial coding frame. Regular meetings were held to discuss and modify the coding frame for data analysis. Perspectives were crosschecked and clarified with participants during subsequent IDIs. The mutually agreed codes were systematically assembled into a final coding frame. Any difference or disagreement in coding was deliberated between the investigators to reach a consensus. Data saturation was considered at the point when no new

code emerged from further interviews. The codes were then analysed iteratively to identify emergent themes, and framed against the HITAM zones. Additional perspectives were grouped if they did not align to the zones. NVivo software version 12 was used to support data analysis.

## RESULTS

18 people were approached in total, and 16 agreed to participate. The participants included 7 males and 9 females, and their ages ranged from 38 to 65 years, mean age 54.5 years. The interviews lasted between 16 and 28 minutes. **Table 1** showed the demographic characteristics of the participants.

Table 1: Demographic characteristics of study participants (N=16)

Characteristics	Number (%)
Sex	
Male	7 (44%)
Female	9 (56%)
Age (years)	
Below 50	5 (31%)
50 to 60	5 (31%)
Above 60	6 (38%)
Ethnicity	
Chinese	11 (68.8%)
Malay	2 (12.5%)
Indian	2 (12.5%)
Ceylonese	1 (6.2%)
Highest education level	
Primary	6 (37.5%)
Secondary	2 (12.5%)
Diploma/ High school	5 (31%)

University	3 (19%)
Type of housing	
1-3 room public housing apartment	2 (12.5%)
4-5 room public housing apartment	12 (75%)
Condominium/ Private property	2 (12.5%)
Need to pay tax last year?	
Yes	9 (56%)
No	7 (44%)
Received medical subsidy?	
Yes	6 (37.5%)
No	10 (62.5%)
Non-communicable diseases	
T2DM	10 (62.5%)
HTN	10 (62.5%)
HLD	15 (94%)
T2DM + HTN + HLD	7 (44%)
Others*	6 (37.5%)
Total number of NCD	
4 or more	3 (19%)
3	8 (50%)
1 or 2	5 (31%)

Legend: \*Others included obesity, gout, osteoarthritis, hypothyroidism

NCD: non-communicable diseases

HLD: hyperlipidaemia

HTN: hypertension

T2DM: type-2 diabetes mellitus

Results relating to the participants' views and concerns of VC were grouped into three main themes: perceived benefits of VC utility, perceived barriers of VC adoption, and potential challenges of VC. Themes and subthemes were supported with corresponding verbatim.

#### **Perceived benefits of VC utility**

### *Stable NCD were suitable for VC*

Participants with stable NCD viewed themselves as suitable for VC, as they expected minimal changes to their current treatment plans.

“I feel (the) general public will benefit from this, and chronic illness people like me.” (P014, 47-year-old male with well-controlled T2DM, hypertension, hyperlipidaemia and osteoarthritis)

### *Perceived safe environment*

Participants viewed VC at home as safe for them during the COVID-19 pandemic, as they can avoid polyclinics which also manage patients with acute respiratory infections.

“I think it’s a very good practice ... no need to go directly in contact with another person ... the separation is there.” (P004, 65-year-old male)

“A lot of things changed already because of this COVID-19 ... you have to have safe distancing” (P001, 63-year-old male)

### *Convenience and time-savings*

Participants perceived VC as convenient due to time-savings from travelling, waiting in clinics, and saving day-off from work.

“Raining I still need to make it here (clinic), whereas for VC, rain or shine, the doctor is there ... it is a very beneficial thing for patients.” (P006, 63-year-old female employee)

“When I come down to the clinic, I actually take leave instead of taking time off for all these visits. If we have VC right now, it's working from home. I can just pop by and have a VC done.” (P015, 38-year-old female office-worker)

## **Perceived barriers of VC adoption**

### *Concern about suboptimal care*

Participants were concerned that the lack of physical examination in VC might affect clinical care. A clinic visit might be necessary if they needed investigations or thorough assessment.

“The few days I got leg pain, back ache, all these I cannot talk (mention) in the video ... My leg swollen they (doctors) also cannot see. Blood test we have to come here.” (P005, 61-year-old female with osteoarthritis)

“I think the perception is that patients still need the physical examination by the doctor to see the actual cause of the illness.” (P011, 52-year-old male)

### *Concern about medication supply*

In a face-to-face consultation, medication collection is usually done on the same day in the clinic. As it takes days to deliver medications to patients after VC, participants highlighted the need to ensure adequate medications at home.

“I'm ok with VC, as long as I have sufficient medication while waiting for the medicine to come.” (P015, 38-year-old female)

### *Network connectivity and personal medical data security*

Some participants were concerned about network connectivity.

“Some families' internet connection may not be good ... (upcoming 5G network) it's on the infrastructure ... Now 4G (is) also very stable.” (P011, 52-year-old male)

Most believed that data would be managed securely and kept confidential.

“Personally, I feel it's quite secured ... Zoom meetings are secured data over internet ... you don't repeat the meeting.” (P014, 47-year-old male, degree-holder)

## **Potential challenges of VC**

### *Digital health familiarity*

Participants competent in IT skills were confident of VC and did not expect technical difficulties.

“We're all working from home. I think Zoom is fine. Because I've tried using Zoom for video conferencing.” (P015, 38-year-old female, degree-holder)

However, less tech-savvy participants were concerned and anticipated help from their family.

“I'm not IT savvy ... I have to learn and catch up with all the advanced technology.” (P001, 63-year-old male, secondary school education and receiving medical subsidy)

“Computer I'm not sure (familiar), how can I catch up? That's why I go to SG Digital.” (P002, 56-year-old female, primary school education. Singapore Digital (SG:D) aimed to equip Singapore's older adults with digital skills)

### *Familiarity with own mobile and telemonitoring devices*

In order to be eligible for VC, patients need to have their own mobile devices to join the session, and a blood pressure (BP) machine to report their BP to the doctor. Participants did not foresee difficulties with VC if they owned these devices. However, those without the devices might encounter challenges with VC.

“I've got no issue because I got all these machines (blood pressure machine and glucometer) at home. But some (low-income patients) really can't monitor themselves at home regularly. They have to go to the polyclinics or the GP, the clinic itself.” (P013, 43-year-old female with T2DM and hypertension)

### *Healthcare expenses*

Direct and indirect cost considerations were brought up by participants. They believed that VC should be made affordable.

“It doesn’t make sense that the price is more expensive; I might as well see my doctor (in-person).” (P006, 63-year-old female, taxpayer living in private property)

“I can’t really say how much it should be but the main issue is that everybody can afford it.” (P013, 43-year-old female, not paying tax, living in public housing)

Other considerations include the cost of Wi-Fi, mobile data, and cost savings in terms of time and travelling.

“The internet - every month I have to pay, then I can use it at home.” (P003, 62-year-old female, not paying tax, living in public housing)

“The government has to make it very attractive ... it has to be low cost. People will certainly think ‘why do I need to spend more when I’m using my time to set up my gadget’.” (P011, 52-year-old male, taxpayer)

## **DISCUSSION**

### **Summary**

This qualitative study referred to the HITAM model as a conceptual framework to understand non-VC users’ views and concerns towards VC for NCD management in Singapore primary care. This study identified three themes: (1) perceived benefits of VC utility, (2) perceived barriers of VC adoption, and (3) potential challenges of VC.

### **Strengths and Limitations**

This study used the HITAM model as a framework to explore participants' views and concerns towards VC which they had yet to try. This novel approach helped to showcase how health, information and technology factors might influence VC adoption among patients with NCD. Addressing the factors would allow physicians to explore ways to encourage VC uptake among primary care patients with NCD in future.

This study had its limitations. Only English-speaking participants were included. Participants were introduced to VC via video and not direct-experience. However, interviewing these non-users were useful to explore reasons why they had yet to adopt VC. The NCD included in our study generally do not require physical examination by clinicians during follow-up care. Thus, we might not be able to generalise the findings to other NCD requiring physical examination, such as asthma and COPD. Future research could be done to include these respiratory NCD, and explore the experience of the various stakeholders in the VC system, including VC users with NCD and healthcare providers.

### **Comparison with existing literature**

Participants with stable NCD were keen to adopt VC, but had concerns about clinical care. A British study showed that while patients appreciated the “customer care” aspect of enhanced convenience in teleconsultation, they prioritised the “clinical care” of doctor-patient interaction.<sup>[12]</sup> King et al showed how telemedicine could enhance face-to-face services based on patients' needs and context.<sup>[18]</sup> Proper patient selection and a hybrid clinical care model comprising VC and face-to-face consultations could be the way forward.<sup>[7,19]</sup> Doctors can identify suitable patients in clinic and offer them VC for subsequent reviews.

## **Implications to clinical practice**

Our study was conducted in the midst of the pandemic, when VC was newly introduced. Various countries envisioned family physicians to tap on digital technology advancements to care for the population.<sup>[19,20]</sup> Telemedicine would be scaled up for home-based, technology-enabled self-management of NCD to improve primary care capability.<sup>[21,22]</sup> However, a concern raised in our study was the availability of telemonitoring devices needed for VC. To complement VC for NCD follow-up, provision of home telemonitoring devices and do-it-yourself investigations to patients can be explored. A Singapore study showed that telemonitoring with teleconsultation improved blood pressure control and was cost-effective.<sup>[23]</sup> Self-administered laboratory tests for NCD might also be feasible.<sup>[24]</sup> These methods could encourage and support patients with NCD to opt for VC.

It is important to recognise VC as a system involving the patient and other stakeholders. Healthcare costs and network connectivity highlighted in our study can also influence their willingness to adopt VC. The PERCS (Planning and Evaluating Remote Consultation Services) framework by Greenhalgh et al depicts how various domains such as the patient, staff, organisation, technologies and the wider system interact and influence one another.<sup>[25]</sup> Gilbert et al reported that VC implementation posed challenges such as the lack of suitable infrastructure, and a fully integrated system would require infrastructural improvement.<sup>[18, 26]</sup> As demonstrated in a Scotland case-study,<sup>[27]</sup> a well-established infrastructure supported by a national strategic vision can help to expand VC services in times of need. Addressing the concerns and challenges identified in this study will allow physicians and policy-makers to review the resources and mindset shifts necessary to encourage VC uptake. The MOH Office for Healthcare Transformation was set up to reshape Singapore's health system and explore how technologies can be incorporated in primary care. In addition, Singapore's Infocomm

Media Development Authority is developing a 5G network coverage,<sup>[28]</sup> which will strengthen the technological infrastructure for VC. These concerted efforts are good initial steps to scale up telemedicine in Singapore.

## **CONCLUSION**

This study used the HITAM model to explore non-VC users' perspectives towards adopting VC for NCD follow-up. Participants viewed VC as convenient and safe. Concerns about the absence of physical examination and medication supply were perceived barriers. Challenges to VC adoption include digital health unfamiliarity and healthcare expenses. A hybrid clinical care model comprising in-person and teleconsultation may be the way forward for NCD management.

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## **ETHICAL APPROVAL**

This study was reviewed and approved by the SingHealth Centralised Institutional Review Board (CIRB), reference number 2020/3051.

## **DECLARATION OF CONFLICTING INTERESTS**

The authors declare that there is no conflict of interest.

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#### **DATA AVAILABILITY STATEMENT**

The data that support the findings of this study are available from the corresponding author upon reasonable request.

#### **ABBREVIATIONS**

BP: blood pressure

CIRB: Centralised Institutional Review Board

GP: general practitioner

HIT: health information technology

HITAM: Health Information Technology Acceptance Model

HLD: hyperlipidaemia

HTN: hypertension

IDI: in-depth interviews

MOH: Ministry of Health

NCD: non-communicable diseases

NHS: National Health Service

SHP: SingHealth Polyclinics

T2DM: type-2 diabetes mellitus

VC: video consultation

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