

## Introduction

A direct-to-consumer tele-health model had to be utilized for cardiology visits due to COVID-19 related mandatory stay-at home orders issued on March 16, 2020 by the Kentucky state government. Kentucky presented as a unique study population as it ranked among the 10 worst states for age-adjusted total cardiovascular deaths per 100,000 persons and household income.<sup>1,2</sup> Tele-health in this population presented an especially significant challenge as 1 in every 4 households lack broadband internet connection.<sup>3</sup> The literature does not represent the use of cardiology tele-health in this unique context.

## Methods

An online Qualtrics survey was constructed and patients that scheduled a visit during the time frame when cardiology patients were being seen exclusive by telemedicine (March 15 – June 7) were invited to participate. Survey questions were mostly in a Likert or Likert-type scale that assessed multiple factors involving previous in-person visit experience, tele-health appointment experience, reasons for declining tele-health appointments, and perceived advantages and disadvantages of tele-health. Experiences for in-patient and tele-health visits were assessed on patient satisfaction with doctor-patient communication, interpersonal connection, and clinical competence.

## Results

Survey respondents (N=193) reported positive experiences with in-person and tele-health experiences, but in-person experiences were more positive.

Table 1. Summary of responses by those who participated in tele-health, characterizing their tele-health (n = 106) and in-person (n = 96) experiences. Columns 3-7 show number and percentage of respondents selecting a given response. Columns 8-9 summarize tests of difference in means for items between formats. Column 10 rank-orders items by mean. Column 11 shows the Spearman correlation between individual items and respondent's overall rating of their experiences; all were significant at p < 0.001.

Survey Domains and Items	Mode	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree	Mean ± SE	p-value	Rank Order	Spearman r
<b>Patient-Centered Communication (Cronbach's alpha: Tele = 0.920; In-P = 0.973)</b>										
PCC-1. My cardiologist seemed interested in my medical concerns.	Tele	5 (4.7)	1 (0.9)	8 (7.6)	30 (28.3)	62 (58.5)	4.35 ± 0.10	0.741	2	0.46
	In-P	2 (2.1)	2 (2.1)	5 (5.2)	29 (30.2)	58 (60.4)	4.45 ± 0.09		3	0.49
PCC-2. My cardiologist tried to find out everything that was concerning me.	Tele	7 (6.6)	2 (1.9)	5 (4.7)	38 (35.8)	54 (51.0)	4.23 ± 0.11	0.220	5	0.40
	In-P	2 (2.1)	3 (3.1)	7 (7.3)	25 (26.0)	59 (61.5)	4.42 ± 0.09		4.5	0.48
PCC-3. My cardiologist was interested in establishing a medical partnership with me.	Tele	4 (3.8)	2 (1.9)	15 (14.1)	45 (42.5)	40 (37.7)	4.09 ± 0.09	0.163	10	0.35
	In-P	2 (2.1)	1 (1.0)	7 (7.3)	34 (35.4)	52 (54.2)	4.39 ± 0.09		9	0.41
PCC-4. Instructions and treatment plans were clear to me at the end of the visit.	Tele	4 (3.8)	3 (2.8)	8 (7.6)	44 (41.5)	47 (44.3)	4.20 ± 0.09	0.536	7.5	0.40
	In-P	2 (2.1)	2 (2.1)	5 (5.2)	33 (34.3)	54 (56.3)	4.41 ± 0.09		7	0.56
<b>Clinical Competence (Cronbach's alpha: Tele = 0.879; In-P = 0.938)</b>										
CC-1. My cardiologist provided an appropriate level of medical care.	Tele	5 (5.7)	2 (1.9)	8 (7.6)	39 (36.7)	51 (48.1)	4.20 ± 0.10	0.705	7.5	0.43
	In-P	2 (2.1)	2 (2.1)	5 (5.2)	33 (34.4)	54 (56.2)	4.41 ± 0.09		7	0.40
CC-2. My clinical exam was thorough.	Tele	5 (4.7)	6 (5.7)	29 (27.4)	38 (35.8)	28 (26.4)	3.74 ± 0.10	0.007	11	0.49
	In-P	2 (2.1)	2 (2.1)	14 (14.6)	30 (31.2)	48 (50.0)	4.25 ± 0.10		11	0.41
CC-3. I had confidence in my cardiologist's clinical competence.	Tele	5 (4.7)	0 (0.0)	6 (5.7)	39 (36.8)	56 (52.8)	4.30 ± 0.09	0.265	3	0.40
	In-P	2 (2.1)	1 (1.0)	4 (4.2)	26 (27.1)	63 (65.6)	4.53 ± 0.08		1	0.45
<b>Interpersonal Skills (Cronbach's alpha: Tele = 0.931; In-P = 0.927)</b>										
IS-1. My cardiologist seemed supportive of my emotions.	Tele	4 (3.8)	2 (1.9)	14 (13.2)	42 (39.6)	44 (41.5)	4.13 ± 0.10	0.761	9	0.39
	In-P	2 (2.1)	2 (2.1)	10 (10.4)	34 (35.4)	48 (50.0)	4.29 ± 0.09		10	0.41
IS-2. I was comfortable discussing my medical concerns.	Tele	4 (3.8)	3 (2.8)	7 (6.6)	40 (37.7)	52 (49.1)	4.26 ± 0.10	0.540	4	0.39
	In-P	2 (2.1)	3 (3.1)	6 (6.3)	27 (28.1)	58 (60.4)	4.42 ± 0.09		4.5	0.42
IS-3. My cardiologist displayed appropriate interpersonal skills.	Tele	4 (3.8)	0 (0.0)	6 (5.7)	37 (34.9)	59 (55.6)	4.38 ± 0.09	0.332	1	0.42
	In-P	3 (3.1)	2 (2.1)	5 (5.2)	24 (25.0)	62 (64.6)	4.46 ± 0.10		2	0.53
<b>Supportive Environment</b>										
SE-1. My interaction with other in-office personnel was professional.	Tele	5 (4.7)	0 (0.0)	10 (9.4)	43 (40.6)	48 (45.3)	4.22 ± 0.09	0.367	6	0.32
	In-P	2 (2.1)	1 (1.0)	7 (7.3)	32 (33.3)	54 (56.3)	4.41 ± 0.09		7	0.41
<b>Overall</b>										
Average ratings of all items	Tele	-	-	-	-	-	4.19 ± 0.08	0.001	-	-
	In-P	-	-	-	-	-	4.40 ± 0.08		-	-
Overall, how did you feel about your [telemedicine/in-person] experience?	Tele	2 (1.9)	3 (2.8)	5 (4.7)	25 (23.6)	71 (67.0)	4.51 ± 0.08	0.221	-	-
	In-P	1 (1.0)	1 (1.0)	6 (6.4)	20 (20.8)	68 (70.8)	4.59 ± 0.08		-	-

Table 2. Distribution of responses to survey items relating to respondents' basis for opting out of tele-health, and perceived advantages/disadvantages of tele-health by those who had a tele-health appointment.

	No Factor	Somewhat	Primary
<b>Factors in Declining Telemedicine (n = 32)</b>			
Not scheduled – no. (%)	5 (15.6)	7 (21.9)	20 (62.5)
Not Medically Necessary – no. (%)	17 (53.1)	5 (15.6)	10 (31.3)
Access to Technology – no. (%)	30 (93.8)	0 (0.0)	2 (6.3)
Comfort with Technology – no. (%)	25 (78.1)	5 (15.6)	2 (6.3)
Privacy Concerns – no. (%)	30 (93.8)	1 (3.1)	1 (3.1)
Preference for In-Person – no. (%)	12 (37.5)	13 (40.6)	7 (21.9)
<b>Advantages to Participating in Telemedicine (n = 106)</b>			
Reduced Travel Time – no. (%)	12 (11.3)	33 (31.1)	61 (57.5)
Reduced Visit Wait Time – no. (%)	12 (11.3)	37 (34.9)	57 (53.8)
Travel Cost Savings – no. (%)	19 (18.0)	44 (41.5)	43 (40.5)
<b>Disadvantages to Telemedicine (n = 106)</b>			
Poor Internet Connectivity – no. (%)	71 (67.0)	27 (25.5)	8 (7.5)
Device Technology Issues – no. (%)	82 (77.4)	19 (17.9)	5 (4.7)
Comfort w/ Device/Software – no. (%)	76 (71.7)	21 (19.8)	9 (8.5)
Communication Issues – no. (%)	73 (68.9)	26 (24.5)	7 (6.6)
Privacy Concerns – no. (%)	91 (85.8)	11 (10.4)	4 (3.8)

## Results (CONT.)

Survey respondents (N=193) reported positive experiences with in-person and tele-health experiences, but in-person experiences were more positive. Respondents reported a significantly lower mean in level of satisfaction with their clinical exam during their telehealth visit (Table 1). Also, all tele-health 'items' had lower levels of satisfaction than their in-person counterparts (Table 1). However, tele-health was seen to have large advantages in the aspects of reducing travel time and saving costs when compared to in-person visits (Table 2).

## Conclusion

COVID-19 presents as an especially dangerous and contentious time for cardiology patients, which may create a positive bias toward tele-health that would not have been observed prior to the rise of COVID-19. Caution must be used when comparing in-person and tele-health experiences during this timeframe, even though few significant difference were seen between the two modalities. However, tele-medicine still had consistently lower satisfaction in all elements despite the potential for positive bias. This further signifies the need for continued improvement of tele-health. Similarly, our data highlights the need for further research into the experience of patients with tele-health during the pandemic, patient experience with tele-health outside the context of a pandemic, and the standardization of measuring key clinical data using tele-health.

## References

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