

Attitude of Korean Primary Care Family Physicians Towards Telehealth

Original
Article

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Background: Recently, a revised telehealth legislation that allows direct doctor to patient teleconsultation was proposed in Korea. However, there have been some debates. This study aimed to examine the attitude of primary care physicians towards telehealth.

Methods: A questionnaire asking attitude towards telehealth and revised telehealth legislation was self-administered to 1,988 registered members of Practitioners Council of Korean Academy of Family Medicine. A total of 218 complete responses by family physicians were included in the study.

Results: Large proportion (60.6%) of participants disagreed to the main clause of revised telehealth legislation, which allowed doctor to patient teleconsultation. Participants tended to expect that negative outcomes are more likely to occur than positive outcomes after the enforcement of the revised telehealth legislation. Around 50% of participants had an intention to adopt telehealth just as soon (4.6%) or afterwards (45.4%). The majority of participants suggested that; primary care clinic as the most appropriate telehealth facility (75.4%); patients with low accessibility to medical care (74.3%) as the best target of telehealth service; and tele-radiology (61.9%) or tele-pathology (41.3%) as the most applicable medical field for telehealth service. Around 89% of participants suggested telehealth service fee to be similar or higher than current medical consultation fee.

Conclusion: The majority of family physicians participating in this study were not in favor of the revised telehealth legislation. However, the majority of the participants had an intention to adopt telehealth to their practice and held clear opinion about practical aspects of telehealth.

Keywords: Telemedicine; Family Physician; Private Practice; Attitude

INTRODUCTION

An advance in technology has strongly influenced healthcare services and currently offers various methods for medical diagnosis. Among these services, telehealth has emerged as an adequate modality to serve the public. However, there is no global consensus regarding the scope and use of telehealth. According to World Medical Association, telehealth is a way of practicing medicine over a long-distance, in which interventions, diagnostic and treatment decisions, and recommendations are based on data, documents, and other information transmitted through telecommunication system.¹⁾ On the other hand, the American

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Telemedicine Association uses the term ‘telehealth’ to encompass a broader definition of remote healthcare that does not always involve clinical services.²⁾ In Korea, telehealth legislation was first introduced in March of 2003, which defines telehealth as “the use of informatics technology for primary physicians to convey medical technology and/or medical knowledge to each other over a distance”.³⁾ However, there has been no complete consensus regarding the scope of this definition in detail.

Although long time has passed since the introduction of debate about telehealth, telehealth has not been actively put into the health services. A closer look into the previous usage of telehealth service reveals that it was hindered by the lack of supporting infrastructure and reluctance of the primary care physicians in spite of the several attempts to conduct pilot projects for telehealth since 1988. However, with the changing landscape of the health services, the ministry of health and welfare started to place great value on the telehealth as a new type of powerful growing industry. The ministry of health and welfare has proposed a revision of telehealth legislation in 2009 to alleviate the limitations on telehealth. Subsequently, in April of 2010, this proposal was passed in the cabinet meeting and is currently submitted to the national assembly. The revised telehealth legislation allows direct teleconsultation between doctor and patient, deputy person’s receipt of prescription by proxy, and forwarding electronic prescription to the pharmacy of the patient’s choice.³⁾

In response to these revisions, Korean Medical Association has renounced teleconsultation between doctor and patient by declaring an antigovernment resolution in May of 2010.⁴⁾ Moreover, there have been a great gap in opinions among the healthcare professionals, health care related governmental departments, and social authorities.

In Korea, there have been several studies: studies evaluating the efficacy of a pilot project of telehealth;^{5,6)} a study estimating the willingness to pay for telehealth services;⁷⁾ and studies showing the recognition of medical providers and users on telehealth.⁸⁻¹⁰⁾ However, there is a dispute regarding the reliability of these studies because they were conducted based on unrevised telehealth guidelines and there were insufficient number of doctors involved in the studies as participants. In addition, in order for telehealth to be enforced as a viable healthcare service, there must be studies regarding the doctors’ perception towards

telehealth and revised telehealth legislation as well as in depth discussions regarding the consequences which telehealth may bring in. In this regard, this study aimed to investigate the attitude of primary care family physicians towards telehealth and their opinions regarding the revised telehealth legislation.

METHODS

1. Study Participants

We conducted a questionnaire survey of 1,988 members of the Practitioners Council of Korean Academy of Family Medicine (KAFM) enrolled in the 2010 April registry of KAFM, from April 20th 2010 to May 15th 2010. The questionnaire was mailed to all 1,988 members and emailed to 304 members whose email address was known. We also provided the participants with an option to reply via mail or via internet by visiting a website (<http://blog.naver.com/telehealth>). A total of 223 primary care family physicians participated in the survey. Of those participants, 30 physicians replied via internet. Among the 223 participants, 5 physicians with incomplete response were excluded. Thus, the current study finally consisted of a total of 218 (11.0%) participants.

2. Questionnaires

The questionnaire consisted of the following: the participant’s socio-demographic characteristics, their attitude towards the revised telehealth legislation, their attitude towards anticipated outcomes in medical environment from the use of teleconsultation, and their thoughts on how to adopt telehealth.

Socio-demographic characteristics were sex, age, duration of specialty license, duration of working at local primary care clinic, clinic location, number of patients per day, and current use of electronic medical record. Each of the three revised clauses of the telehealth legislation was separately asked with three response items; agreement, conditional agreement, or disagreement. If the participant selected conditional agreement from the three choices, they were asked to disclose their opinions about the sufficient condition of the clause to which they would agree. The participants were also asked to give their opinion to each of positive (nine items) and negative (nine items) aspects of anticipated outcomes that could occur after the execution of

teleconsultation between doctor and patient according to the revised telehealth legislation. The 18 items which were chosen for this questionnaire were based on previous studies.^{9,10)}

The participants were also asked to answer the following list of questions: previous telehealth usage, their knowledge upon the recent revisions on the telehealth legislation, their knowledge on which medical modalities pertain to telehealth, their foresight into which medical field would most likely benefit from telehealth, their predicted target patient population, their view on a viable medium for telehealth services, their intention to put telehealth in their offices, and an appropriate fee for telehealth services.

3. Statistical Analysis

The characteristics of the study participants and attitudes towards telehealth were analyzed by descriptive statistics. χ^2 test was employed for analysis of relevant factors on agreement and disagreement on the revised telehealth legislation. We used Fisher's exact test if the sample size was 5 or less. We also used χ^2 test to analyze their attitude to positive or negative anticipated outcomes and the readiness to adapt to the revised telehealth system. Statistical analysis was performed using SPSS ver. 18.0 (SPSS Inc., Chicago, IL, USA). A significance level of 0.05 was set for all tests.

RESULTS

1. Characteristics of Study Participants (Table 1)

There were more males (84.4%, n = 184) than females (15.6%, n = 34) in the group. Those who were aged 45–54 years were most prevalent (43.1%). More than half (55%) of the participants were practicing at local clinics located in Seoul and metropolitan city. Participants owning specialty license for 10–19 years were the most prevalent (42.7%). Participants who have worked for 10–19 years at a local clinic formed the majority (38.5%). Participants seeing 50–99 patients per day were the most common (53.7%). Participants utilizing electronic medical record (75.2%) far outweighed non-users.

2. Previous Experience of Telehealth Usage (Table 1)

62.4% (n = 136) of the participants were aware of the recent

Table 1. Characteristics of study participants.

Variables	No.	(%)
Sex		
Male	184	(84.4)
Female	34	(15.6)
Age (y)		
30–44	67	(30.7)
45–54	94	(43.1)
55–	57	(26.2)
Duration of specialty holding (y)		
0–9	55	(25.2)
10–19	93	(42.7)
20–	70	(32.1)
Duration of working at local primary care clinic (y)		
0–9	78	(35.8)
10–19	84	(38.5)
20–	56	(25.7)
Clinic location		
Seoul	60	(27.5)
Metropolitan city	60	(27.5)
Middle or small city	66	(30.3)
Rural area	32	(14.7)
No. of patients per day		
–49	69	(31.6)
50–99	117	(53.7)
100–	32	(14.7)
Current use of electronic medical record	164	(75.2)
Previous use of telehealth*		
Exchanges of medical information via internet	96	(44.0)
Teleeducation	66	(30.3)
Online medical counseling	57	(26.1)
Teleconsultation between doctors	9	(4.1)
Telemonitoring	8	(3.7)
Knowledge upon the recent revisions on the telehealth legislation*	136	(62.4)

*The number does not sum up to 218 due to duplicated choose of response or non-response by some participants.

revisions on the telehealth legislation. Previous experience using telehealth consisted of the following: exchanges of medical

Table 2. Factors related with the agreement on the revised telehealth legislation.

Variables	Doctor - patient teleconsultation			A deputy person to receive prescription by proxy			Forwarding electronic prescription		
	Agree (n = 86)	Disagree (n = 132)	P-value	Agree (n = 126)	Disagree (n = 92)	P-value	Agree (n = 97)	Disagree (n = 121)	P-value
Sex									
Male	71 (38.6)	113 (61.4)	0.544*	104 (56.5)	80 (43.5)	0.375*	80 (43.5)	104 (56.5)	0.482*
Female	15 (44.1)	19 (55.9)		22 (64.7)	12 (35.3)		17 (50.0)	17 (50.0)	
Age (y)									
30-44	27 (40.3)	40 (59.7)	0.896*	40 (59.7)	27 (40.3)	0.294*	30 (44.8)	37 (55.2)	0.657*
45-54	38 (40.4)	56 (59.6)		58 (61.7)	36 (38.3)		39 (41.5)	55 (58.5)	
55-	21 (36.8)	36 (63.2)		28 (49.1)	29 (50.9)		28 (49.1)	29 (50.9)	
Duration of specialty holding (y)									
0-9	18 (32.7)	37 (67.3)	0.462*	32 (58.2)	23 (41.8)	0.227*	24 (43.6)	31 (56.4)	0.862*
10-19	40 (43.0)	53 (57.0)		59 (63.4)	34 (36.6)		40 (43.0)	53 (57.0)	
20-	28 (40.0)	42 (60.0)		35 (50.0)	35 (50.0)		33 (47.1)	37 (52.9)	
Duration of working at local primary care clinic (y)									
0-9	24 (30.8)	54 (69.2)	0.035*	40 (51.3)	38 (48.7)	0.005*	33 (42.3)	45 (57.7)	0.870*
10-19	42 (50.0)	42 (50.0)		60 (71.4)	24 (28.6)		39 (46.4)	45 (53.6)	
20-	20 (35.7)	36 (64.3)		26 (46.4)	30 (53.6)		25 (44.6)	31 (55.4)	
Clinic location									
Seoul	26 (43.3)	34 (56.7)	0.883*	30 (50.0)	30 (50.0)	0.416*	22 (36.7)	38 (63.3)	0.324*
Metropolitan city	22 (36.7)	38 (63.3)		39 (65.0)	21 (35.0)		26 (43.3)	34 (56.7)	
Middle or small city	25 (37.9)	41 (62.1)		39 (59.1)	27 (40.9)		31 (47.0)	35 (53.0)	
Rural area	13 (40.6)	19 (59.4)		18 (56.3)	14 (43.8)		18 (56.3)	14 (43.8)	
No. of patients per day									
-49	28 (40.6)	41 (59.4)	0.816*	31 (44.9)	38 (55.1)	0.028*	31 (44.9)	38 (55.1)	0.943*
50-99	47 (40.2)	70 (59.8)		76 (65.0)	41 (35.0)		51 (43.6)	66 (56.4)	
100-	11 (34.4)	21 (65.6)		19 (59.4)	13 (40.6)		15 (46.9)	17 (53.1)	
Current use of electronic medical record									
Yes	62 (37.8)	102 (62.2)	0.387*	100 (61.0)	64 (39.0)	0.098*	72 (43.9)	92 (56.1)	0.759*
No	24 (44.4)	30 (55.6)		26 (48.1)	28 (51.9)		25 (46.3)	29 (53.7)	

Values are presented as number (%).

*Examined by chi-square test. †Examined by Fisher's exact test.

Table 2. Continued.

Variables	Doctor - patient teleconsultation			A deputy person to receive prescription by proxy			Forwarding electronic prescription			
	Agree (n = 86)	Disagree (n = 132)	P-value	Agree (n = 126)	Disagree (n = 92)	P-value	Agree (n = 97)	Disagree (n = 121)	P-value	
Previous use of telehealth										
Teleconsultation	Yes	6 (66.7)	3 (33.3)	0.160 [†]	7 (77.8)	2 (22.2)	0.308 [†]	2 (22.2)	7 (77.8)	0.304 [†]
	No	80 (38.3)	129 (61.7)		119 (56.9)	90 (43.1)		95 (45.5)	114 (54.5)	
Online medical counseling	Yes	24 (42.1)	33 (57.9)	0.633*	34 (59.6)	23 (40.4)	0.742*	25 (43.9)	32 (56.1)	0.911*
	No	62 (38.5)	99 (61.5)		92 (57.1)	69 (42.9)		72 (44.7)	89 (55.3)	
Telemonitoring	Yes	5 (62.5)	3 (37.5)	0.269 [†]	4 (50.0)	4 (50.0)	0.724 [†]	3 (37.5)	5 (62.5)	0.735 [†]
	No	81 (38.6)	129 (61.4)		122 (58.1)	88 (41.9)		94 (44.8)	116 (55.2)	
Teleducation	Yes	26 (39.4)	40 (60.6)	0.991*	39 (59.1)	27 (40.9)	0.799*	28 (42.4)	38 (57.6)	0.685*
	No	60 (39.5)	92 (60.5)		87 (57.2)	65 (42.8)		69 (45.4)	83 (54.6)	
Exchange of medical information via internet	Yes	41 (42.7)	55 (57.3)	0.383*	58 (60.4)	38 (39.6)	0.487*	41 (42.7)	66 (61.7)	0.638*
	No	45 (36.9)	77 (63.1)		68 (55.7)	54 (44.3)		56 (45.9)	66 (54.1)	
Knowledge upon the recent revisions on the telehealth legislation	Yes	53 (40.2)	79 (59.8)	0.793*	70 (53.0)	62 (47.0)	0.077*	56 (42.4)	76 (57.6)	0.446*
	No	33 (38.4)	53 (61.6)		56 (65.1)	30 (34.9)		41 (47.7)	45 (52.3)	

Values are presented as number (%).

*Examined by chi-square test. [†]Examined by Fisher's exact test.

information via internet (44%), teleeducation (30.3%), online medical counseling via internet or mobile device (26.1%), teleconsultation between doctors (4.1%), and telemonitoring (3.7%).

3. Factors Related with the Agreement on the Revised Telehealth Legislation (Table 2)

To the revised telehealth legislation clause allowing direct teleconsultation between doctor and patient, 20.2% (n = 44) of the participants agreed, 19.3% (n = 42) conditionally agreed and 60.6% (n = 132) disagreed. The participants who conditionally agreed to the clause proposed that the teleconsultation could be a viable option under the following conditions; if the patient has low accessibility to traditional medical system (n = 8), if the patient suffers from a chronic illness that requires continuous management (n = 7), if the doctor has already obtained sufficient information from the patient (n = 3), or if the patient's home is equipped with medical tools needed for telehealth (n = 2).

To the revised telehealth legislation clause allowing a deputy person to receive prescription by proxy, 33.5% (n = 73) of the participants agreed, 24.3% (n = 53) conditionally agreed, and 42.2% (n = 92) disagreed. The participants who conditionally agreed to the clause proposed that this could be a viable option under the following conditions; if it is allowed only for the patient whose mobility is significantly limited (n = 4) and only a lawfully designated person could receive prescription by proxy (n = 3).

To the revised telehealth legislation clause allowing electronic delivery of prescription to the pharmacy of the patient's choice, 27.5% (n = 60) of the participants agreed, 17.0% (n = 47) conditionally agreed, and 55.5% (n = 121) disagreed. The participants who conditionally agreed to the clause proposed that this clause could be a viable option under the following conditions; the pharmacist must be under strict restriction against using alternative or similar medication (n = 3) and the qualification of the pharmacist must be strictly validated (n = 2).

Table 2 shows the characteristics of the participants according to the agreement to the revised telehealth legislation, in which conditional agreement was categorized to 'agreement'. There was a significant association between the duration of working at a local clinic and agreement on doctor to patient teleconsultation (P = 0.035). A detailed analysis of this group revealed that participants who worked for 10–19 years at a local clinic were more likely to

agree to it than participants who worked at a local clinic for less than 10 years (P = 0.013, not shown in the table).

There was a significant association between the duration of working at a local clinic (P = 0.005) as well as the number of daily patient visits (P = 0.028) and the agreement to the clause that allowing a deputy person to receive prescription by proxy. Further analysis of this group revealed that participants who worked for 10–19 years at a local clinic were more likely to agree to the clause than participants who worked at a local clinic for less than 10 years (P = 0.009, not shown in the table) or for more than 20 years (P = 0.003, not shown in the table). Furthermore, participants who saw 50–99 patients per day agreed to the clause more than those who saw less than 49 patients per day (P = 0.009, not shown on the table).

4. The Anticipated Outcome Following the Introduction of Doctor–Patient Teleconsultation (Table 3)

Overall, greater number of participants tended to agree to the negative anticipated outcomes than to the positive anticipated outcomes that may occur after the enforcement of the revised telehealth legislation. Notably, 52.8% agreed to that there will be an 'improvement in accessibility to health services'. However, the participants did not show favoritism towards other positive items. Only 34.4% agreed to an anticipation of 'decrease in medical expense at individual level'. 33.0% agreed to 'increase in patients' concern about health'. 31.2% agreed to 'improvement in imbalance of regional allocation of medical resources'. 30.7% agreed to 'improvement in medical knowledge of patient'. A mere 22.9% agreed to 'decrease in medical expense at national level'. 22.5% agreed to 'increase in number of outpatient consultation'. 15.6% agreed to 'improvement in doctor-patient relationship' and only 7.8% agreed to 'increase in physician's income'.

Subsequently, more than 90% of the participants agreed to negative anticipated outcomes from the revised telehealth legislation. 95.4% felt there would be 'unclear legal responsibility for medical malpractice'. 93.6% agreed to worries regarding the 'flooding of patients to tertiary health care centers'. 92.2% agreed to 'troubles related with setting teleconsultation fee'. 91.3% agreed to concerns regarding the 'technical problems for running telehealth system'. Finally, 90.4% agreed to worries about 'issues regarding protection of patient information'.

Table 3. The anticipated outcomes based on the introduction of doctor-patient teleconsultation.

Lists of anticipated outcomes in medical environment	Approval for doctor-patient teleconsultation			P-value*
	Overall	Yes	No	
Improvement in accessibility to health service	115 (52.8)	69 (80.2)	46 (34.8)	<0.001
Decrease in medical expense at individual level	75 (34.4)	44 (51.2)	31 (23.5)	<0.001
Increase in patients' concern about health	72 (33.0)	44 (51.2)	28 (21.2)	<0.001
Improvement in imbalance of regional allocation of medical resources	68 (31.2)	40 (46.5)	28 (21.2)	<0.001
Improvement in medical knowledge of patient	67 (30.7)	39 (45.3)	28 (21.2)	<0.001
Decrease in medical expense at national level	50 (22.9)	28 (32.6)	22 (16.7)	0.006
Increase in outpatient consultation	49 (22.5)	34 (39.5)	15 (11.4)	<0.001
Improvement in doctor-patient relationship	34 (15.6)	26 (30.2)	8 (6.1)	<0.001
Increase in physician's income	17 (7.8)	13 (15.1)	4 (3.0)	0.001
Unclear legal responsibility for medical malpractice	208 (95.4)	80 (93.0)	128 (97.0)	0.198
Concentration of patients to tertiary health care centers	204 (93.6)	78 (90.7)	126 (95.5)	0.161
Troubles related with setting teleconsultation fee	201 (92.2)	75 (87.2)	126 (95.5)	0.026
Technical problems for running telehealth system	199 (91.3)	77 (89.5)	122 (92.4)	0.460
Issues regarding protection of patient information	197 (90.4)	76 (88.4)	121 (91.7)	0.420
Increase in inadequate medical care	196 (89.9)	74 (86.0)	122 (92.4)	0.127
Burden on telehealth system	194 (89.0)	77 (89.5)	194 (89.0)	0.836
Troubles related to the education of patients with new system	177 (81.2)	70 (81.4)	107 (81.1)	0.951
Troubles related to the education of patients with new system	132 (60.6)	51 (59.3)	81 (61.4)	0.761

Values are presented as number (%).

*P-value, examined by chi-square test.

Participants who agreed to a direct doctor-patient teleconsultation also showed significant tendency for anticipating positive outcomes. Participants who disagreed to doctor-patient teleconsultation showed significant agreement to only one of the nine items of negative anticipated outcome (i.e., there would be troubles related with setting teleconsultation fee) ($P = 0.026$).

5. Participants' Views on the Introduction of Telehealth System in Accordance with Revised Telehealth Legislation (Table 4)

To the question asking the scope of telehealth, 'teleconsultation between doctors' was most frequently selected (in 83.9% of participants), which was followed by 'telemonitoring of patient' (in 80.3%), 'online medical counseling via internet or mobile device' (in 65.6%), 'teleducation' (in 46.3%), and 'exchange of medical information via internet' (in 43.6%).

Participants chose radiology (61.9%), pathology (41.3%), cardiology (33.5%), and endocrinology (28.0%) as the most likely medical field to benefit from adopting telehealth systems. Participants also chose residents in rural areas (74.3%), handicapped persons or senior citizens (63.8%), residents in restricted areas (e.g., soldiers, prisoners) (59.6%), patients in need of nursing care (39.9%), and patients with chronic diseases (38.5%) to benefit most from telehealth systems. 75.4% participants believed that primary care clinics should apply telehealth while 44.6% believed tertiary care clinics should.

6. Readiness to Adapt to the Revised Telehealth (Table 5)

When participants were asked about their intention to put telehealth into practice if the revised legislation would be enforced, 45.4% ($n = 99$) replied they would introduce telehealth

Table 4. Participants' views on the introduction of telehealth system.

	Agree	Disagree
Contents of telehealth		
Teleconsultation between doctors	183 (83.9)	35 (16.1)
Telemonitoring (e.g., blood glucose, blood pressure)	175 (80.3)	43 (19.7)
Online medical counseling (via internet or mobile device)	143 (65.6)	75 (34.4)
Teleeducation	101 (46.3)	117 (53.7)
Exchange of medical information via internet	95 (43.6)	123 (56.4)
Don't know	19 (8.7)	199 (91.3)
The most likely medical field to benefit from adopting telehealth systems		
Radiology	135 (61.9)	83 (38.1)
Pathology	90 (41.3)	128 (58.7)
Cardiology	73 (33.5)	145 (66.5)
Endocrinology	61 (28.0)	157 (72.0)
Psychology	30 (13.8)	188 (86.2)
Dermatology	23 (10.6)	195 (89.4)
Emergency disease	16 (7.3)	202 (92.7)
Others	18 (8.3)	200 (91.7)
Target patient population of telehealth		
Residents in rural area	162 (74.3)	56 (25.7)
Physically challenged person, senior citizens	139 (63.8)	79 (36.2)
Residents in restricted area (e.g., soldiers, prisoners)	130 (59.6)	88 (40.4)
Patients in need for nursing care	87 (39.9)	131 (60.1)
Patients with chronic diseases	84 (38.5)	134 (61.5)
Patients in need for postoperative care	65 (29.8)	153 (70.2)
Healthy people having concerns about health promotion	35 (16.1)	183 (83.9)
The other patients	10 (4.6)	208 (95.4)
Appropriate healthcare facility for telehealth*		
Primary care clinic	132 (75.4)	43 (24.6)
Secondary referral center	68 (38.9)	107 (61.1)
Tertiary referral center	78 (44.6)	97 (55.4)

Values are presented as number (%).

*Respondents who chose nothing were excluded.

after a period of observing the situation. 31.7% (n = 69) replied they would absolutely not use telehealth. Finally, 4.6% (n = 10) replied they would utilize telehealth as soon as they could. Participants' intention to adopt telehealth was significantly related to their agreement on doctor-patient teleconsultation. A detailed analysis revealed that participants who disagreed with the use of

doctor-patient teleconsultation did not wish to adopt telehealth at a significant level (P < 0.001, not shown on the table).

Around 89% of participants suggested telehealth service fee to be similar (47.2%) or higher (41.7%) than current medical consultation fee. There was no significant relation between fee and their agreement on doctor-patient teleconsultation.

Table 5. Readiness to adapt to the revised telehealth.

	Approval for doctor-patient teleconsultation			P-value*
	Overall	Yes	No	
Intention to adopt telehealth system				
As soon as possible	10 (4.6)	7 (8.1)	3 (2.3)	<0.001
After others apply	99 (45.4)	60 (69.8)	39 (29.5)	
Never	69 (31.7)	7 (8.1)	62 (47.0)	
Don't know	40 (18.3)	12 (14.0)	28 (21.2)	
Fee for telehealth service compared to current fee for medical consultation				
Should be higher	103 (47.2)	36 (41.9)	67 (50.8)	0.119
Should be the same	91 (41.7)	43 (50.0)	48 (36.4)	
Should be lower	24 (11.0)	7 (8.1)	17 (12.9)	

Values are presented as number (%).
 *P-value, examined by chi-square test.

DISCUSSION

This study is the first survey to investigate the attitude of family physicians working at primary care setting towards telehealth. The findings of this study indicate that Korean primary care family physicians have a high recognition about telehealth, given that a considerable number of family physicians have already used telehealth and they not only define telehealth as a doctor to doctor teleconsultation modality but also recognize telemonitoring, teleeducation and exchange of medical information as additional components of telehealth. This study also indicates that the majority of primary care family physicians recognize telehealth as an important medical gateway, especially for patients who are restricted due to their medical condition or long distance from health care facility.

The participants of the study thought that medical fields such as radiology, pathology, cardiology, and endocrinology would benefit most from telehealth. In fact, foreign countries are already using telehealth in the field of radiology and pathology.¹¹⁻¹³⁾ Additionally, some researches demonstrated that telehealth draws benefits in the field of cardiology and endocrinology.¹⁴⁻¹⁶⁾ Adoption of telehealth in other countries and results of various studies including ours give a guideline for the integration of telehealth. The studies suggest that application of telehealth

should begin in the field of radiology and pathology. It should then expand to the long-term care of chronic diseases in the area of cardiology and endocrinology.

The findings of the current study also indicate that the majority of family physicians disagree with the revised clause which allows doctor-patient teleconsultation and this finding coincides with the view of the Korean Medical Association.

The majority of the participants from this study tended to anticipate negative outcomes from the use of telehealth. However, previous researches from Korea⁶⁾ and Canada¹⁷⁾ demonstrated that telehealth could bring in many positive outcomes such as improved accessibility to healthcare, increase in cost effectiveness, increase in education among doctors, and increase in the quality of medical care. Hence, it is imperative to conduct a study to seek out the reasons why family physicians anticipate negative outcomes from telehealth. It is also necessary to conduct a pilot study to evaluate the efficacy of doctor to patient teleconsultation so as to persuade the public. Before the enforcement of the revised telehealth, issues such as unclear legal responsibility for medical malpractice, troubles related with setting teleconsultation fee, and the protection of patients' confidentiality should be discussed. Furthermore, the impact of introduction of telehealth on health care delivery system should be sufficiently taken into consideration, given that many family physicians worry about the probable flooding of patients towards tertiary health care centers.

The majority of participants in our study suggested telehealth service fee to be similar or higher than current medical consultation fee under the revised telehealth legislation. A previous research⁷⁾ indicated that medical consumers gave good value for telehealth. The study showed that the users of public health centers were willing to pay more for teleconsultation than for usual healthcare service. However, the current fee for healthcare service in a public health centers is much less than the fee in private health sectors. Therefore, the fee a patient would be willing to pay is most likely to be much less compared to the payment that primary care family physicians would demand for a teleconsultation. Hence, the fee for telehealth should be determined reflecting not only the costs involved in the technical application of telehealth but also the costs the patient and the physician would both agree on.

Although there were many who disagreed with the revisions of telehealth, the fact that 50% of the participants in this study were willing to adopt telehealth reminds that many physicians would be willing to utilize telehealth if the aforementioned negative anticipated outcomes would be resolved.

This study has some limitations. Firstly, the response rate was only 11%. Additionally, we couldn't compare characteristics between participants and non-participants. Therefore, these findings may not represent the views of all primary care family physicians. Secondly, those who participated in this study are more likely to have positive attitude towards telehealth than those who did not reply. Thirdly, this study may have overestimated the future usage of telehealth since this study surveyed attitude and the only 7.8% of the participants have actual experience of using doctor to doctor teleconsultation or telemonitoring. Fourthly, the questionnaire we used in this study did not include a statement of the revised clause that says application of teleconsultation should be limited to those patients who have visited the doctor at least once and do not present an imminent medical danger. To minimize the effects of the exclusion of this statement, we included a conditional agreement category in the questionnaire and gave participants an opportunity to disclose their opinions about the sufficient condition of the clause to which they would agree.

In conclusion, the current study found that the majority of primary care family physicians had a negative attitude towards the revised telehealth legislation. Nevertheless, many of them show

willingness to adopt telehealth in the future and expressed a clear opinion about the enforcement direction of telehealth. Therefore, for the sake of successful introduction of telehealth system, further researches are needed to examine the reasons why many physicians did not agree to the revised telehealth legislation and to investigate the way to resolve the negative anticipated outcomes of telehealth. Furthermore, sufficient discussions between related authorities and professionals should be preceded before the enforcement of telehealth in Korea.

REFERENCES

1. World Medical Association. WMA statement on the ethics of telemedicine [Internet]. Ferney-Voltaire: World Medical Association; c2010 [cited 2010 Aug 2]. Available from: <http://www.wma.net/en/30publications/10policies/t3/index.html>.
2. American Telemedicine Association. Telemedicine defined [Internet]. Washington: American Telemedicine Association; c2010 [cited 2010 Jul 20]. Available from: <http://www.americantelemed.org/i4a/pages/index.cfm?pageid=3333>.
3. Ministry of Health and Welfare. Revision of medical legislation [Internet]. Seoul: Ministry of Health and Welfare; c2010 [cited 2010 Feb 2]. Available from: http://www.mw.go.kr/front/jb/sjb0403ls.jsp?PAR_MENU_ID=03&MENU_ID=030403.
4. Korean Medical Association. The anti-government resolution [Internet]. Seoul: Korean Medical Association; 2010 [cited 2010 Jul 20]. Available from: <http://image.kma.org/2010/05/20100514-k.html>.
5. Yoon DH, Kim SP, Kim SJ, Cho SH, Cho NS. Influence on a doctorless island residents' health care utilization by video telemedicine. *J Korean Soc Emerg Med* 2008;19:359-65.
6. Lee KE. Outcome evaluation of telehealth for chronic disease in Kangwon province. *Health Welf Policy Forum* 2005;106:63-76.
7. Kim S, Moon O, Ahn M, Ryu S. Estimating the willingness-to-pay for telehealth services of chronic disease in rural area. *J Korean Soc Health Inf Health Stat* 2007;32:17-31.
8. Rhee HS, Choi MK, Kim KH. The recognition of medical providers and users on telemedicine. *J Health Sci Med*

- Technol 2004;30:59-66.
9. Rhee HS. The recognition of aging on telemedicine. *J Health Sci Med Technol* 2005;31:75-83.
 10. Korea Health Industry Development Institute. Establishment of comprehensive plan for invigoration of u-healthcare. Seoul: Korea Health Industry Development Institute; 2008.
 11. Steinbrook R. The age of teleradiology. *N Engl J Med* 2007;357:5-7.
 12. Cross SS, Dennis T, Start RD. Telepathology: current status and future prospects in diagnostic histopathology. *Histopathology* 2002;41:91-109.
 13. Weinstein RS, Graham AR, Richter LC, Barker GP, Krupinski EA, Lopez AM, et al. Overview of telepathology, virtual microscopy, and whole slide imaging: prospects for the future. *Hum Pathol* 2009;40:1057-69.
 14. Clark RA, Inglis SC, McAlister FA, Cleland JG, Stewart S. Telemonitoring or structured telephone support programmes for patients with chronic heart failure: systematic review and meta-analysis. *BMJ* 2007;334:942.
 15. Neubeck L, Redfern J, Fernandez R, Briffa T, Bauman A, Freedman SB. Telehealth interventions for the secondary prevention of coronary heart disease: a systematic review. *Eur J Cardiovasc Prev Rehabil* 2009;16:281-9.
 16. Polisen J, Tran K, Cimon K, Hutton B, McGill S, Palmer K. Home telehealth for diabetes management: a systematic review and meta-analysis. *Diabetes Obes Metab* 2009;11: 913-30.
 17. Jennett PA, Affleck Hall L, Hailey D, Ohinmaa A, Anderson C, Thomas R, et al. The socio-economic impact of telehealth: a systematic review. *J Telemed Telecare* 2003;9:311-20.