Nationwide online social networking for cardiovascular care in Korea using Facebook

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ABSTRACT
To examine the use of online social networking for cardiovascular care using Facebook. All posts and comments in a Facebook group between June 2011 and May 2012 were reviewed, and a survey was conducted. A total of 298 members participated. Of the 277 wall posts, 26.7% were question posts requesting rapid replies, and 50.5% were interesting cases shared with other members. The median response time for the question posts was 16 min (IQR 8–47), which tended to decrease as more members joined the group. Many members (37.4%) accessed the group more than once a day, and more than half (64%) monitored the group posts in real time with automatic notifications of new posts. Most members expressed confidence in the content posted. Facebook enables online social networking between physicians in near-real time and appears to be a useful tool for physicians to share clinical experience and request assistance in decision-making.

INTRODUCTION
Emergency physicians often encounter challenging cardiovascular cases, such as subtle ST elevated ECGs or tachycardias that are difficult to interpret. Even a well-trained emergency physician with substantial experience may find it difficult to make timely and appropriate decisions in such cases. Immediate in-hospital consultation with experts is not always possible, even in large university or teaching hospitals[1–4]; therefore, the use of telemedicine might help to balance the unequal distribution of experts.

Since June 2011, the Korean Group of Emergency Cardiovascular Care (KGECC) has been using Facebook, especially for challenging cardiovascular care problems. In this article, we describe online social networking service (SNS) activities that occurred in 1 year.

METHODS
Overview
All postings and comments on the KGECC Facebook group from June 2011 to May 2012 were reviewed, and a survey of the members' use of, and trust in, the group was conducted. The KGECC is an official group that is subordinate to the Korean Society of Emergency Medicine (KSEM), which is the public community of emergency medicine in South Korea. Author BSK, who was chairman of the KGECC, created a Facebook group account (http://www.facebook.com/#!/groups/232459190111329) as the KGECC's official online homepage in June 2011 (figure 1) because the account was free and

already well known to many physicians in Korea. The group began with 36 members; it was advertised through the KSEM homepage and through a newsletter sent to other healthcare workers. Only healthcare providers, including medical students, could become members after the approval of an administrator. For applicants whose occupations were not identified in their Facebook profiles, the administrator required proof of their occupations when they joined the group.

Table 1 presents the general characteristics of the members and the growth of membership numbers. By May 2012, there were 298 members, of whom 209 were emergency physicians. This figure represents 13.4% of the total number of emergency physicians (n=1559) in South Korea at that time. The members were distributed across the nation.

Online Facebook use among group members
Facebook contains groups in which members can post messages, photos and videos and reply to the posts of others (known as 'comments'). To receive comments about difficult patient cases, members must upload patient profiles, including clinical information and the examinations performed, such as ECG. Many members reported using the automatic notification function on their smartphones to ensure that they were notified immediately of any new posts. Members were able to share and discuss interesting cases through such posts.

Using Facebook announcements, the administrator periodically notified all members to be cautious about the potential exposure of patients' private information. During the early stages, some errors resulted in the exposure of sensitive patient information. The administrator dealt with these errors in a timely manner by removing the relevant content. After the initial start-up period, no other posts breeched the group's privacy regulations.

Review of wall posts and comments on KGECC's Facebook page
We investigated the following factors for each wall post and comment: (1) the author of the post; (2) posting time; (3) the number of comments; (4) the suggested diagnoses; (5) the diagnostic tools used; and (6) the purpose of the post (four pre-designated categories).

Two senior authors (BSK and HJC) classified the posts into four pre-designated categories (figure 1): (1) category 1: question posts about a difficult case at the time of the encounter, which requested rapid replies to assist in decision-making; (2) category 2: posts discussing informative cases from previous experience; (3) category 3: educational posts
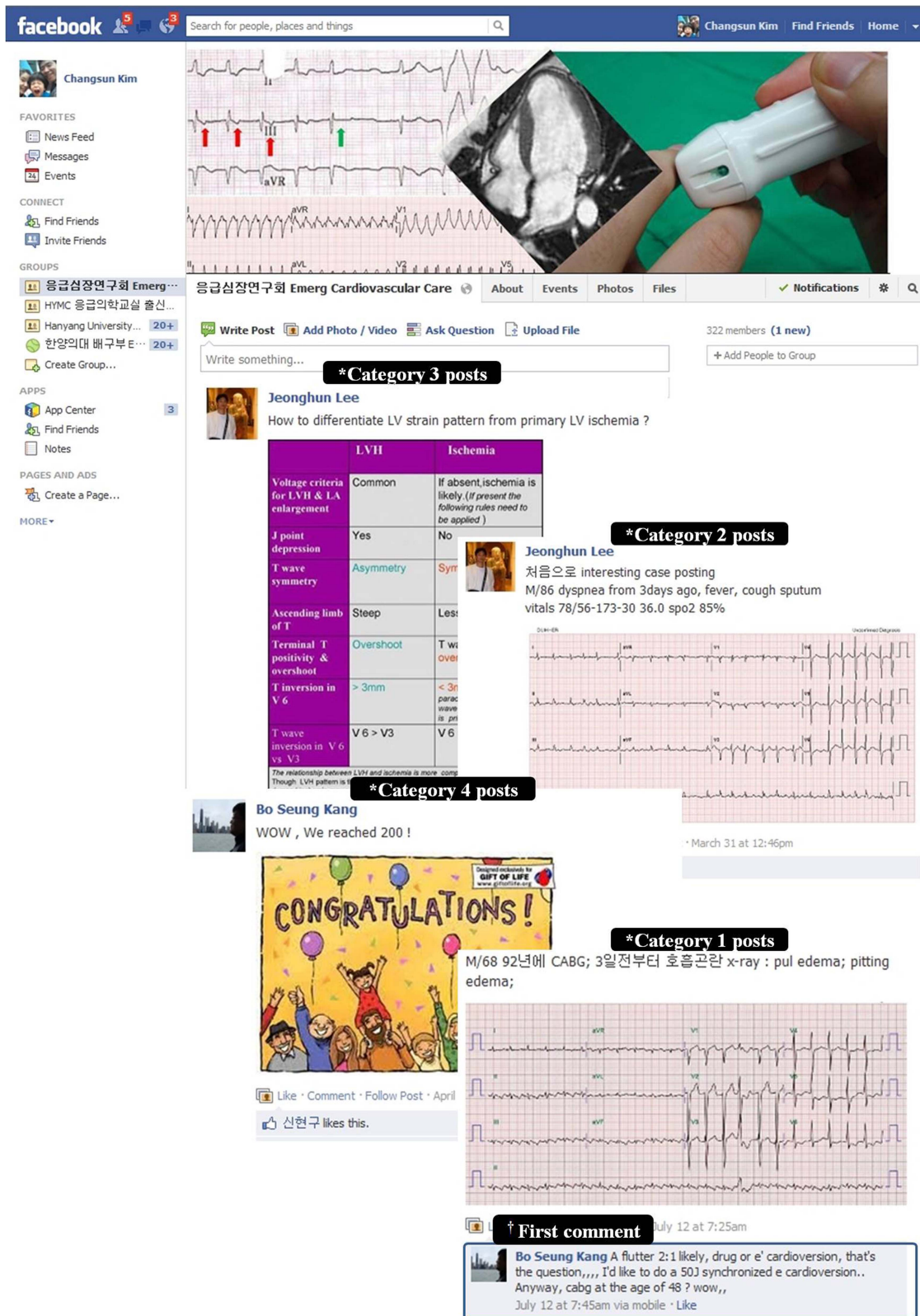
Figure 1 Screenshots from the Korean Group of Emergency Cardiovascular Care on Facebook. *Category 1: question posts regarding a difficult case, which requested rapid replies to assist in decision making; category 2: posts discussing interesting and informative cases from previous experience; category 3: educational posts to convey informative knowledge or something; category 4: announcements posts to notify the members of something. †First comment indicate the first reply on a new post.

conveying informative knowledge, sharing references, or notifying others of informative websites; or (4) category 4: announcement posts notifying others of conferences, workshops, and other events. Ambiguous posts were classified by consensus conferences with BSK and HJC. Inter-rater reliability was examined using Cohen's κ statistic (κ=0.82).

Table 1 Demographics of participants (Facebook group of KGECC)

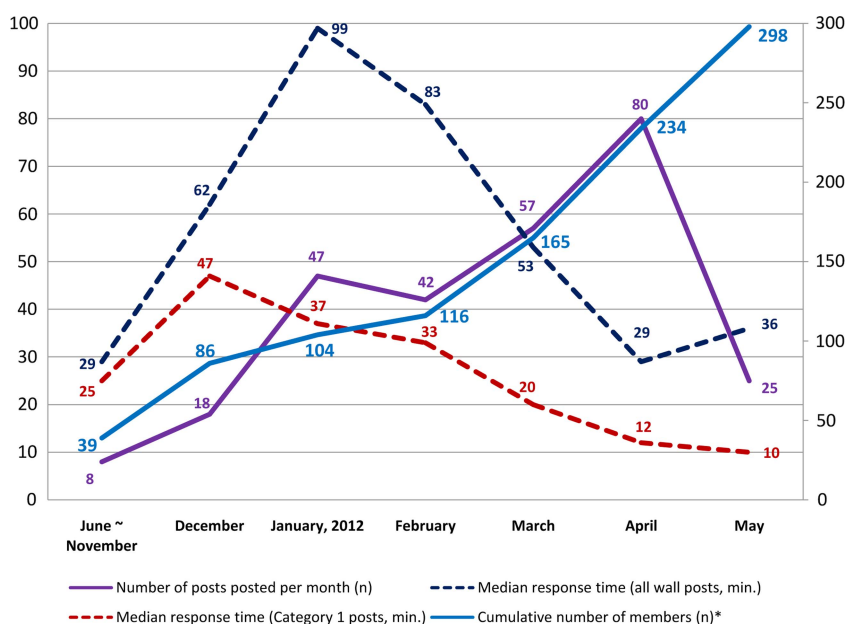| Characteristics	Value
Age, median (IQR)	35 (29–43)
Gender, n (%)	
Male	239 (80.2)
Female	59 (19.8)
Type of occupation, n (%)	
Board-certified physicians	165 (55.4)
Professors or attending physicians working in university or teaching hospitals	114 (38.3)
Physicians working in community hospitals	51 (17.1)
Residents	44 (14.8)
Medical students	80 (26.8)
Emergency medical technicians	9 (3.0)
Cumulative numbers of members, n (%)	
2011	
June	36 (12.1)
July–September	36 (12.1)
October	37 (12.4)
November	39 (13.1)
December	86 (28.9)
2012	
January	104 (34.9)
February	116 (38.9)
March	165 (55.4)
April	234 (78.5)
May	298 (100.0)
Total	298 (100.0)

KGECC, Korean Group of Emergency Cardiovascular Care.

'Response time' was defined as the interval between a newly submitted post and its first comment. Individuals who posted comments were defined as 'respondents', and those who posted first comments (defined as the first comment on a new post) more than three times were considered 'major respondents'.

Survey of Facebook use and its reliability

A paper survey was carried out at the annual meeting of KGECC in June 2012 to investigate members' use of Facebook and the reliability of the content posted. A second survey was sent by email, a third survey was conducted by telephone, and a fourth survey was administered through Facebook messaging.

The questions were as follows:

1. Do you have a smartphone?
2. Which devices do you usually use when you access the KGECC Facebook group?
   i. smartphone
   ii. personal computer.
3. How often do you access the group?
   i.   less than once a week
   ii. once a week
   iii. between two and four times a week
   iv. five or six times a week
   v.   more than once a day.
4. Do you use the automatic notification function?
5. How reliable do you find the content in the Facebook group? (five-point Likert scale: 1=very unreliable, 5=very reliable).

Data analysis

SPSS V.18.0K for Windows (SPSS Inc, Illinois, USA) was used for all statistical analyses. Statistical significance was set at 0.05. Most data are expressed as medians with IQRs. The Mann–Whitney U and Kruskal–Wallis tests were used to conduct non-parametric analyses.

RESULTS
Characteristics of the group posts and comments

Of the 277 total posts, 74 posts (26.7%) were classified as category 1, which elicited 667 comments; the median number of comments for each post was 6 (IQR 3–10). Physicians primarily used the Facebook group for ECG interpretations. Of the category 1 posts, 86.5% (64/74) were related to emergencies with the following ECG interpretations: narrow-QRS tachycardia (23/74, 32.4%), wide-QRS tachycardia (17/74, 23.0%), and acute coronary syndrome (24/74, 32.4%). There were 140 informative cases for discussion in category 2, in which ECG-related cases were also the most common (74.3%, 104/140); the majority also related to arrhythmias and acute coronary syndrome.

Figure 2 Number of postings and members per month, and median response time to first comment per month. *The number of members (blue line) is plotted on the secondary y axis.

Initially, there were few posts within the group (8/277, 2.9%) (figure 2). However, as membership grew, the number of posts each month increased regularly (except for the last month of the study).

Response times

The median response time was 55 min (IQR 14–166). The response time was initially brief (29 min, IQR 2–303) but gradually increased. However, after January 2012, the median time decreased again (figure 2). A similar monthly pattern of response times was evident for the category 1 posts.

The median response time for category 1 posts was 16 min (IQR 8–47), which is significantly shorter than for the other types of posts (median 87, IQR 26–263) (table 2).

According to work shifts (ie, day, evening, or night), the response time for all types of posts was longest at night, but this effect was not statistically significant (p=0.130). Category 1 posts yielded similar results (p=0.100) (table 2).

Characteristics of the major respondents

There were 14 major respondents. All, with the exception of one cardiologist, were professors at university or teaching hospitals specializing in emergency medicine who worked night shifts.

Only four of the major respondents took part actively during the early phase of the group. Two others began participating during November 2011. The remaining eight became active participants during January 2012. These respondents supplied 89.6% of the first comments (241/269).

Survey results

Figure 3 presents the results of the survey. Of the 298 surveys distributed, 211 (70.8%) were completed. Of the 211 respondents, 201 (95.3%) had smartphones, and 174 (82.5%) generally used them to access the group. More than half of the respondents (134/211, 63.5%) were automatically notified of new posts, and 37.4% (79/211) accessed the group more than

once a day. Finally, 95.7% of the respondents (202/211) stated that the content was reliable or very reliable. All of the major respondents accessed the group more than once a day and checked the posts in real time with automatic notifications of new posts.

DISCUSSION

SNSs, including Facebook, are good settings for networking among physicians with common interests. Members can post messages, pictures, and videos that include patients' clinical information, and numerous experts are simultaneously notified of the upload, which enables any available experts to respond. Furthermore, most SNSs are free to use. Using this medium, members have been able to seek advice from experts fairly quickly and to share opinions, clinical experience, and knowledge. In our study, we introduced a new large-scale online social networking group of medical physicians using Facebook and assessed its potential for real-time online responses to challenging cardiovascular cases. To our knowledge, this endeavor is the first in the medical literature to describe such a group.

The most important element for establishing this group was the voluntary participation of members and experts. During the early stages, only four experts were actively involved, including the administrator. At that time, four experts appeared to be sufficient to maintain this small group, which comprised 36 members. At this stage, we advertised our SNS group using all types of online and offline approaches. As this online social networking trial gained in popularity, more members joined, and the number and frequency of posts both increased, which led to an increase in response times. Since December, we have attempted to recruit more experts (ie, major respondents) through personal acquaintances with the administrator and through existing experts in the group. Beginning in January, as the number of active experts increased, the response time has begun to decrease, and the accuracy and reliability of the content was also expected to increase. Research shows that interactive processes among the expert physicians (ie, collective

Table 2 Characteristics of posts and comments posted on Facebook in 1 year

Characteristics	The number of posts, n (%)	p Value	Response time* median, minimum (IQR)	p Value
Types of the posts†				
Category 1	74 (26.7)	0.001‡	16 (8–47)	<0.001‡
Others			87 (26–263)	
Category 2	140 (50.5)		70 (18–263)	
Category 3	44 (15.9)		119 (44–256)	
Category 4	19 (6.9)		102 (39–273)	
Total	277 (100)		55 (14–166)	
By posting time (work shift)				
All types of the posts				
Day (9:00–17:00)	150 (54.2)	0.132§	57 (14–155)	0.130§
Evening (17:00–01:00)	106 (38.3)		42 (11–140)	
Night (1:00–9:00)	21 (7.6)		133 (27–327)	
Question posts (category 1)				
Day (9:00–17:00)	32 (43.2)	0.364§	18 (9–50)	0.100§
Evening (17:00–1:00)	37 (50.0)		16 (5–34)	
Night (1:00–9:00)	5 (6.8)		83 (22–276)	

*Response time is the interval between a newly submitted post and its first comment.
†Category 1, question posts about a difficult case at the time of the encounter, which requested rapid replies to assist in decision-making; category 2, posts discussing informative cases from previous experience; category 3, educational posts to convey informative knowledge; category 4, announcements posts to notify the members of something.
‡Calculated using the Mann–Whitney U test.
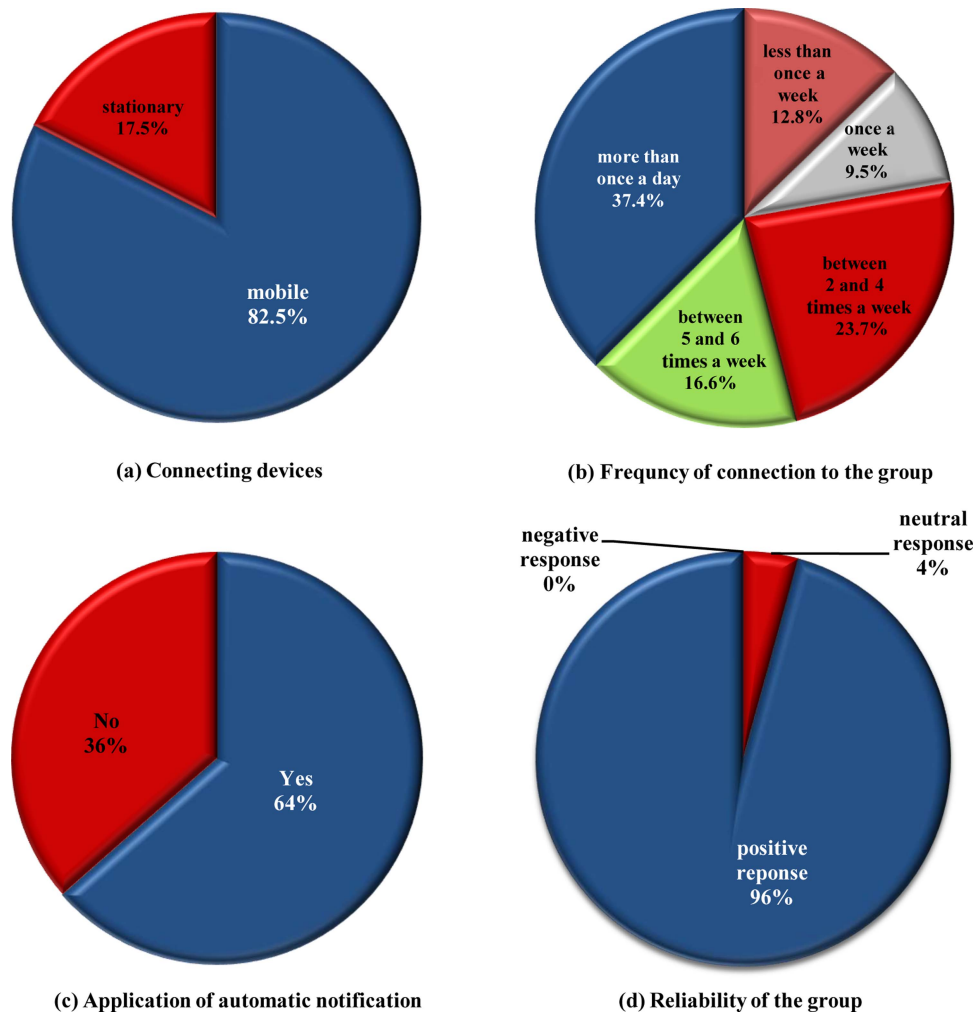§Calculated using the Kruskal–Wallis test.

(a) Connecting devices

(b) Frequncy of connection to the group

(c) Application of automatic notification

(d) Reliability of the group

Figure 3 Survey results according to device used, frequency of connection to the group, automatic notification, and reliability of content (of the total 298 participants, 211 (70.8%) completed the survey).

intelligence) can generate improved diagnoses.[5][6] The active participation of experts who were already well-known physicians in Korea appeared to encourage other physicians to join the group, which experienced a dramatic increase in participation from March 2012. Currently, 165 (55.4%) of the 298 participants are board-certified specialists, and 14 active experts (ie, major respondents) take part in the group. All the major respondents are professors or attending physicians at university or teaching hospitals who were willing to participate in academic activities such as ours without compensation.

The service is intended to be available at any time in any place. In this study, some posts and comments were made during the night, probably because the majority of members are emergency physicians and typically work night shifts.[7] In our group, 13 of 14 major respondents (92.9%) worked night shifts. If more night-shift members become involved, then the response times at night should decline, and if this activity is expanded worldwide, then the decrease in response time may be evident both day and night given the time differences between countries. This service can be accessed anywhere as smartphones are now widely used. In our population, most members (95.3%, 201/211) had their own smartphones with nationwide internet connectivity, which has long been established in South Korea.[8] Thus, our members were able to participate in this group regardless of their location.

In this study, some members participated actively, whereas others did not. This variation may arise because the content discussed in the group primarily consists of challenging clinical cases from real practices; therefore, members with less clinical experience may have insufficient knowledge to post and comment actively. Most of the first comments (89.6%) were posted by the 14 major respondents, who were affiliated with prestigious hospitals and had more clinical experience in cardiovascular care. This tendency was also evident for the category 2 posts, which involved introducing and sharing clinical experience. In the survey, however, most members responded that they had participated actively by reviewing the group content, even when they had never posted or commented on any post.

In our study, the median response time to category 1 posts was 16 min, which may be a long time for an emergency. However, most posts appeared to offer expert opinions about ECG interpretations, such as questions about identifying an ST-elevation myocardial infarction (STEMI). Consequently, in such cases, a poster could afford to wait a few minutes. In many cases, an unclear diagnosis might have become evident through the active discussion among experts. This group was occasionally used in a clinical setting; for example, a patient with chest pain initially perceived as non-STEMI, was then diagnosed as STEMI through these processes, and finally underwent emergency coronary angiography. However, the site does not take

legal responsibility for decisions based on the opinions posted. The Korean government does not provide any official laws pertaining to online consulting or similar practices.

Although our results are limited to cardiovascular care by emergency physicians in one country, we believe that the use of online social networking among physicians, as used by our group, can be applied to different healthcare settings. Based on our experience, we recommend one administrator and a minimum of four or five experts when initializing a similar service. In our case, these experts were recruited during two offline academic meetings over a period of 4 months. These offline meetings, which included bimonthly academic meetings and annual conferences, were accompanied by our online service. Through these meetings, we promoted our group and encouraged physicians to participate. We believe that our group has been well maintained in this 1-year period because our group services have satisfied the needs of our members. For instance, our members can gain access to information and indirect experience in interesting cases through category 2 postings and can request help when encountering challenging cases. Even experienced experts can receive feedback from other experts during discussions, which encourages their voluntary participation. In addition, most of our members are relatively young and familiar with using SNSs via smartphones, which facilitated the rapid establishment of our group. We had originally believed that with an increasing age of members, the frequency of online social networking use would decrease. However, one of the major respondents participated actively in our group despite his older age (58 years), and a previous study stated that increasing age does not increase anxiety about the use of technology.[9] We believe that age may not be problem for using SNSs, given their ease of use.

CONCLUSIONS

Facebook enables online social networking between physicians in real time or near-real time and appears to be a useful tool for physicians to share clinical experience and request assistance in decision-making.

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