Research article

The administrative burden on physicians and technicians for organizing international telemedicine conferences: utility of a shared program management system in an international telemedicine network☆

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HIGHLIGHTS

- Managing conference programs is an obstacle to international telemedicine education.
- We developed a management system for routine international telemedicine education.
- The system was effective in managing the institutions, members, and publications.

ARTICLE INFO

ABSTRACT

Background: The use of international telemedicine conferences for doctor-to-doctor education has increased following the coronavirus disease 2019 pandemic to ensure health and safety. Previous studies have shown that administrative tasks are an obstacle to promoting international telemedicine conferences but have not identified the type of system needed to alleviate this burden.
Objective: The Asia-Pacific Advanced Network Medical Working Group (APAN-MWG) is an international telemedicine network that includes 1171 medical institutions and 3653 members as of July 21, 2021. The APAN-MWG has supported international telemedicine conferences since 2005 and implemented a program management system in 2014. The present study explores the conference organizers' tasks and evaluates the APAN-MWG management system through a survey of organizers.
Methods: We developed a system called med-hok for managing conference programs, international medical institutions, and their members. We investigated all event programs using the med-hok system from June 3, 2015 to July 21, 2021. The target samples included 64 conference programs in 12 series hosted by 13 program organizers. The effectiveness of the system was evaluated using a four-point Likert scale (very good, good, poor, and very poor). The User Experience Questionnaire (UEQ) was used to assess user experience.
Results: The survey response rate of the program organizers, who hosted 11 different program series in 7 Asian countries, was 92% (12/13). The administrative tasks for managing the programs were primarily handled by physicians (67%, 8/12), followed by technicians (17%, 2/12). The average program scope encompassed 7 countries, 10 institutions, and 44 members. The largest program comprised 194 members from 49 institutions in 25 countries and was managed by two physicians and one technician. Most program organizers (8/12, 67%) indicated that verifying member information was the most burdensome aspect of organizing teleconferences. Over 90% of respondents positively evaluated med-hok in the following areas: "Confirmation of institution information," "Confirmation of member information," "Confirmation of technical information," "Maintaining the latest status of the program," "Announcing and publicizing the event," and "Formatting and correcting misspellings."

They rated user experience positively for all aspects (attractiveness: 1.22; practical quality: 1.42; and hedonic quality: 1.24).
Conclusions: Many tasks of organizing casual international telemedicine conferences are handled by physicians and technicians with no operating funds or staff, unlike those in large academic conferences. The proposed system was found to help program organizers manage participants and communicate information effectively. These findings suggest that international telemedicine networks should implement an administrative support system to conduct program operations efficiently.

1. Introduction

The spread of the coronavirus disease 2019 (COVID-19) has increased the use of secure and convenient online audio–video communication [1, 2, 3, 4]. In medical institutions, online conferences of physicians are now being held as a substitute for on-site routine conferences and training; these conferences are organized at both small and large scales in single hospitals, a group of domestic hospitals, and international hospitals [5]. In particular, international telemedicine conferences, such as case conferences and live demonstrations, help reduce medical disparities by providing opportunities to learn advanced diagnostic techniques and treatments practiced worldwide or deal with rare cases that are not commonly encountered in a particular region [6, 7, 8, 9, 10, 11]. In telemedicine, this type of activity is categorized as doctor-to-doctor (D-to-D) education in which multiple patients benefit from educational programs that train physicians in new methods, in contrast to the traditional doctor-to-patient (D-to-P) telemedicine model that connects a medical specialist with one patient [12, 13].

Widespread access to easy and inexpensive videoconferencing (VC) platforms such as Zoom™ (San Jose, CA) or Google Meet® (Google LLC, Mountain View, CA) has made it possible for anyone to organize a conference by sending a VC connecting link with the potential participants, including the chairs and presenters. In the case of a major academic congress, program organizers can work with a conference committee or contractor that handles conference operations on their behalf or use fee-based program management systems which is billed on a per-event basis. However, the routine organization of international telemedicine conferences is typically handled by a limited number of people, and the administrative burden of organizing such an event is a hurdle [10]. No prior studies have examined the type of system required to assist program organizers in organizing and promoting international telemedicine conferences.

There are two important barriers to the routine organization of international telemedicine conferences. The first involves the complexity of inviting and coordinating participants from various global medical institutions. Program organizers must contact presenters, chairpersons, and discussants from various institutions and verify that the contact information and local time zones of the participants are correct before inviting them. It has been reported that online conferences conducted within a single organization can be implemented using a "Learning Management System"; however, there is no comparable dedicated infrastructure that connects multiple institutions in the context of organizing international medical conferences [14, 15, 16]. The second barrier deals with the maximization of program dissemination. As a particular program is useful to institutions worldwide, it is essential to increase the value of the program by promoting the conference in advance to attract a large audience. Therefore, administrative support is indispensable for promoting tasks such as advertising the program on websites timely.

The Asia-Pacific Advanced Network Medical Working Group (APAN-MWG) has upheld international telemedicine conferences since 2005 [17]. With the support of the APAN-MWG secretary, conference organizers can create a conference program to disseminate information about their event and publicize it on their homepage; this information includes details regarding the conference title, participating institutions, date and time (local time) of all participating institutions, chairpersons, discussants, technical support staff, and presentation schedule. In 2014, the

med-hok system was developed to support the management of the programs organized by the APAN-MWG secretary and external program organizers. Previous studies have demonstrated the benefits of this system in terms of systematic data management and information sharing [18]. However, no user evaluation of the system has been conducted until date; therefore, it is unclear how effective the system is in terms of the program organizers' work and user experience [19]. In this study, we introduce the system and operating method in the APAN-MWG context and conduct an evaluation of the program organizer application. Our study is guided by the following research questions:

1. What are the professions of the people responsible for planning and managing international telemedicine conference programs? How many countries and institutions are managed? How much time is needed to organize a program, and what are the most burdensome tasks?
2. How does the med-hok system help conference organizers? How is the user experience?

2. Material and methods

2.1. System design and workflow

The system design and workflow of the APAN-MWG International Telemedicine Conference are shown in Figure 1. The main functions of the system were the "conference program" and "mailing list." A program organizer conducts the conference program by calling participants using contact lists from various international medical institutions through moderators. The APAN-MWG secretary manages the database of all other conference programs, participating institutions, and members. When the program organizer invites a new institution or member, the APAN-MWG secretary registers the information and grants the organizer permission to use the information. The link to the videoconference system is then sent to all participants using the mailing list. The conference program is automatically published on the website when its status is set as open. In a public program, live streaming of the event can be conducted, and the audience can listen to the audio and view the video free of cost after submitting a registration form.

Before the med-hok was implemented, there was no database system, and all the data were managed using Microsoft® Excel (Redmond, DC). The conference programs were manually created by the program organizers and the APAN-MWG secretary using a Microsoft Excel sheet attached to emails that were shared via a mailing list maintained separately from the programs. The conference programs were converted into Portable Document Format (PDF) files and uploaded to the website by the APAN-MWG secretary. After the med-hok was developed, the APAN-MWG secretary introduced the system to program organizers, and the organizers who agreed to use the system were given a demonstration and a user manual.

We developed the med-hok system using Hyper Text Markup Language (HTML), Cascading Style Sheets (CSS), PHP (v. 7.3.16) and JavaScript on a virtual private server (OS: CentOS 7 x86_64, database: MariaDB 5.5.68) in Japan. The data structure is illustrated in Figure 2. The data are roughly divided into institution, member, and event details. The institution information comprises their location, including country and city names, and the local time zone. Member information includes

members' names, contact information, and institutional affiliations. The conference program and mailing list comprise detailed event information. The system interface of the conference program is illustrated in Figure 3 [20]. In addition to the date, time, and topics, it includes the chairs and technical personnel, schedules according to participants' local time zones, presenters, presentation titles, and connecting institutions. The mailing list consists of participant contacts grouped by medical institutions. A unique email address is created for each event series, which is used by the organizers and the APAN-MWG secretary to make announcements to all participants. When the conference program is released, a new event entry is created on the website. The med-hok system contains the information of all 1171 medical institutions and 3653 members in the network as of July 21, 2021. In addition, the APAN-MWG secretary announced a policy on the registration of members involved in activities, which stated that those who did not wish to register could be removed from the system at any given time. The development of the med-hok was conducted as a research project, and the costs of its development and operation were covered by research funds. The program organizers of APAN-MWG were not charged any fees for hosting the program or for using the med-hok system.

2.2. Survey target

We investigated all planned event programs using the med-hok system from June 3, 2015 to July 21, 2021. The target data were 64 conferences of 12 different series, hosted by 13 organizers. The breakdown of the number of programs by year was 4 in 2016, 5 in 2017, 8 in 2018, 15 in 2019, 17 in 2020, and 15 in July 2021. The program series' member information was extracted from the most recent program's mailing list.

2.3. Evaluation

To evaluate the system's performance, we developed a questionnaire for program organizers regarding the tasks performed by med-hok. Surveys were performed using Google Forms (Google LLC, Mountain View, CA) and sent via email. The questionnaire items were divided into two sections: one was about the administrative tasks for managing an international telemedicine conference program, and the other was about the effectiveness of the med-hok system for handling necessary tasks, as listed in Supplementary Appendix SA1. The majority of the items were evaluated using 4-point Likert scale (very good, good, poor, and very poor). To evaluate user experience, we used the User Experience Questionnaire (UEQ) in English [15, 21] to calculate UEQ scales, including attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Program organizers were asked to rate all 26 items of the UEQ on a 7-point Likert scale, from -3 (fully agree with the negative term) to +3 (fully agree with the positive term). Based on the UEQ, the system's attractiveness was treated as an overall evaluation, and pragmatic and hedonic qualities were calculated. Additionally, we asked questions and solicited opinions as open-ended comments. The comments were analyzed using inductive thematic analysis and categorized in line with two research questions: "What is the current status of organizing conference programs?" and "How do you evaluate the med-hok system?" [22, 23, 24]. Questionnaires excluding the UEQ were administered in February 2021, and additional questionnaires for the UEQ were administered between March and April 2021.

3. Results

3.1. The current status of organizing conference programs

The survey response rate of the program organizers, who hosted 11 different program series in 7 Asian countries, was 92% (12/13). Physicians (67%, 8/12) comprised the majority of those responsible for program management using med-hok, followed by technicians (17%, 2/12). Japan organized the most conferences (33%, 4/12), followed by Malaysia and Indonesia (17%, 2/12 each). The most common number of events organized using med-hok was 2–5 (33%, 4/12), followed by 6–10 (25%, 3/12) (Table 1). In addition, endoscopy was the leading medical
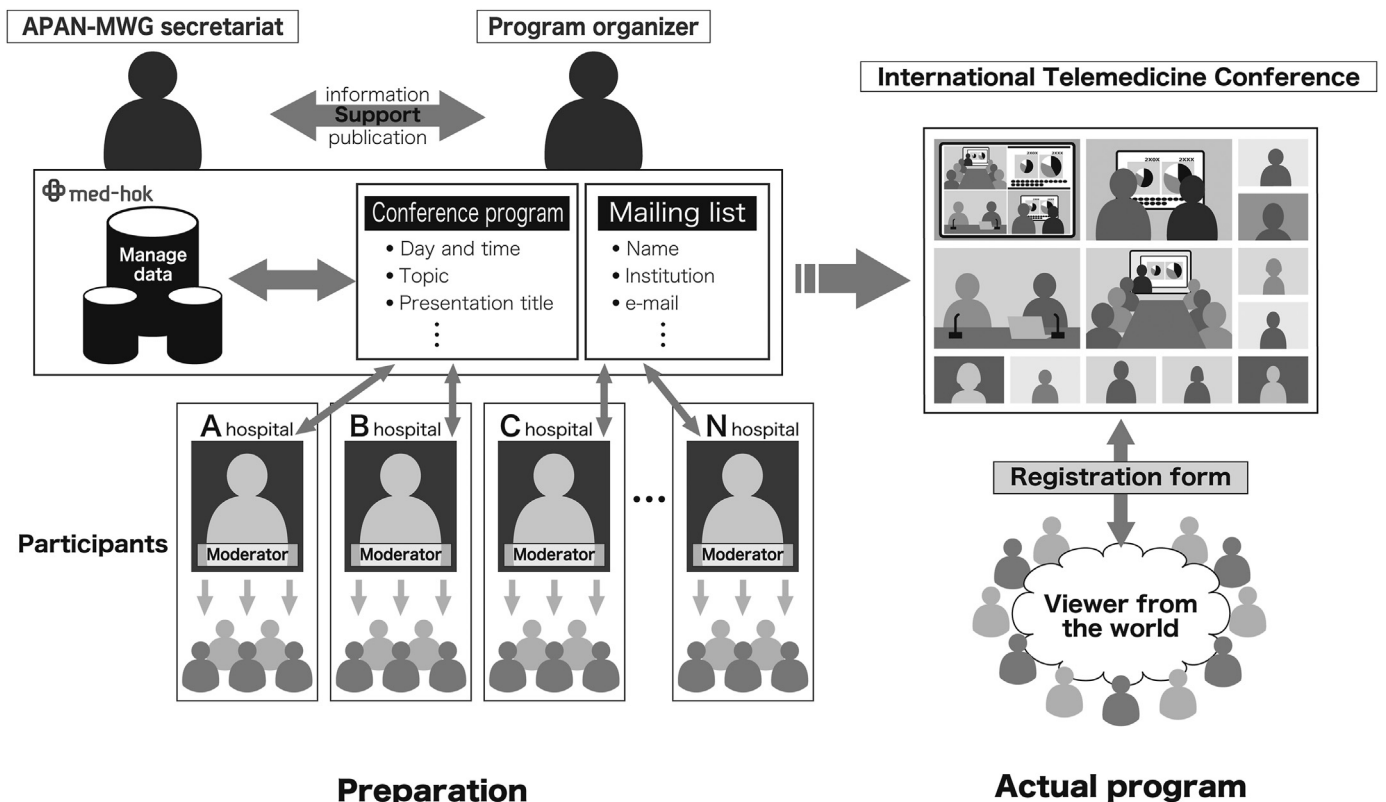

Figure 1. System design and workflow for international telemedicine conferences.

subspecialty of conferences organized using the med-hok system (36%, 4/11), followed by healthcare (18%, 2/11). The median values of the managed programs were seven countries, 10 institutions, and 44 participating members. The largest program, managed by two physicians and one technician, had 194 participating members from 49 institutions in 25 countries (Table 2). The majority of those surveyed (75%, 9/12) indicated that they required one to two weeks to design a program, followed by one month and less than three days (25%, 3/12, respectively). The majority (8/12, 67%) answered that verifying the information of the participating members, such as moderators and presenters, was the most burdensome task (Figure 4).

A thematic analysis of the open-ended comments revealed issues regarding the organization of an international telemedicine conference. As seen in the statements of technician L and coordinator/secretary D, the medical staff have become very busy because of COVID-19, making it difficult to finalize speakers and presentation titles across multiple facilities. Information often changes, especially on the day of the conference, and needs to be updated just before the program begins. The following quote substantiates this concern:

> To get a presentation title will be quite a challenge since most people are quite busy, especially during the COVID-19 pandemic (technician L).

> In our case, there were last minute changes so things got a bit complicated (coordinator/ secretary D).

3.2. Evaluation of the med-hok system

Over 90% of the respondents positively evaluated all items (Figure 5). The most common tasks newly performed using med-hok were "Confirmation of institution information," "Maintaining the latest status of the program," and "Announcing and publicizing the event"

(7 respondents each), followed by "Confirmation of member information," and "Unifying and editing the layout" (5 each). There were no responses for "Nothing new" (Figure 6). Regarding system usability, the majority of respondents answered positively for ease of operation (100%, 11/11), ease of use, intuitive understanding of user interface (100%, 11/11), less malfunctioning or misleading features of the system (82%, 9/11), and technical support for malfunctions and misleading features (91%, 10/11). Comparing with and without med-hok, most respondents preferred to have med-hok for "Confirmation of institution information (82%, 9/11)," "Confirmation of member information (67%, 8/12)," "Confirmation of technical information (73%, 8/11)," "Maintaining the latest status of the program (73%, 8/11)," and "Announcing and publicizing the event (73%, 8/11)." For "Formatting and correcting misspellings," 5 respondents preferred med-hok, 5 preferred the same for with and without med-hok, and 1 preferred without med-hok.

The UEQ results are shown in Figure 7. The results were positive for all items. In summary, the attractiveness score was 1.22, the practical quality was 1.42, and the hedonic quality was 1.24. A thematic analysis of the open-ended comments suggested improvements in med-hok. The first is a simple, error-free system design. Physician K's statement indicates that respondents require med-hok to proactively send alerts and reminders to users. The second is the simplification of member management tasks. Respondents made suggestions to improve the usability of the system (physician A and coordinator/secretary D). Third, the system was well received, and there was a desire for standardization and widespread use in telemedicine networks (coordinator/secretary D and technician L).

> The system should be able to alert the organizer if the name of a moderator or technician is selected more than once in the drop-down list (physician K).
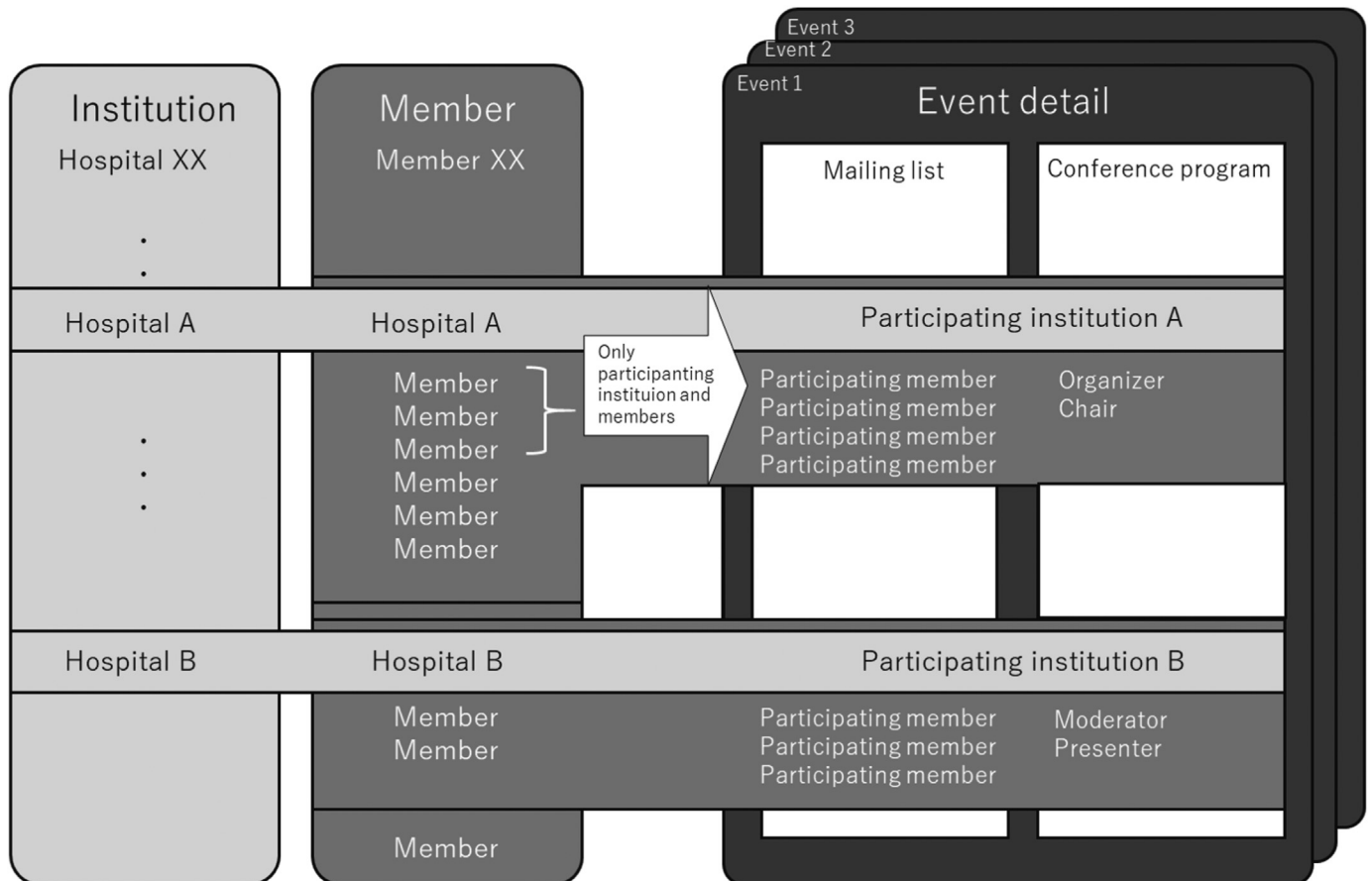

Figure 2. Data structure model of med-hok.

It's a good system once we are familiar with it. It can be very useful if some more editing features are given to the individual user (physician A).

Overall, the system is good. Just the options in the drop-down menu were not in our control (coordinator/secretary D).

This system should be made compulsory for all APAN medical group sessions (technician L).

Figure 3. User Interface of med-hok: conference program.

Table 1. Respondent characteristics.

Items	value (n = 12)	%
Occupation		
Physician	8	67%
Engineer	2	17%
Coordinator, secretary	1	8%
Others	1	8%
Country of origin		
Japan	4	33%
Malaysia	2	17%
Indonesia	2	17%
China, Nepal, Taiwan, India	1 each	8%
Number of events organized		
Once	1	8%
2–5	2	17%
6–10	2	17%
11–15	1	8%
≥16	6	50%
Number of events organized with med-hok		
Once	2	17%
2–5	4	33%
6–10	3	25%
11–15	1	8%
≥16	2	17%

Table 2. Characteristics of program series.

Items	value (n = 11)	
Medical subspecialty	**value**	**%**
Endoscopy	4	36%
Healthcare	2	18%
Surgery, Cardiology, Dentistry, Neurology, Technology	1 each	8%
Scale of program	**Median (Min–Max)**	
Number of participating countries	7 (2–25)	
Number of participating institutions	10 (2–49)	
Number of participating members	44 (11–194)	
Number of program organizers that use-med-hok	**value**	**%**
1	9	82%
≥2	2	18%

4. Discussion

This research revealed the current status and operational issues in organizing international telemedicine conferences within the APAN-MWG. Physicians are the most burdened (67%) with the administrative aspects of organizing conference programs that, on average, involve 44 participating members from 10 institutions of 7 different countries. Notably, the number of participating institutions increased as popular programs continued to be implemented. The largest program, involving 25 countries, 49 institutions, and 194 participating members was managed by physicians and technicians. The administration of participating members required the most time. The management of conference programs that include many international medical institutions is a complex task and is particularly demanding for busy physicians and technicians. However, these international educational activities were conducted voluntarily by organizers and participants to improve medical knowledge and skills at their own institutions without charging participation fees. While the widespread use of VC has greatly reduced the technical burden of organizing telemedicine conferences, the administrative and that of contacting participants remains. With these issues left unresolved, casual information exchange among international medical staff is time-consuming and draining. The majority of participants are physicians who often change the medical institutions with which they are affiliated; therefore, keeping member information up-to-date to avoid losing contact with any participating members. Hence, a unique, effective, and efficient system is vital for providing support for administrative tasks.

The med-hok system was highly valued for supporting international conference management. More than 90% of the program organizers evaluated med-hok positively in all aspects. All respondents were motivated to carry out conference-related tasks they would not have performed otherwise. Most users were especially motivated by the system's function of "Maintaining the latest information, announcements, and publication," which allows users to publish the most current program information online with one click. Building an online database system also improved operational efficiency and enabled the systematic management and publicization of programs that were previously updated
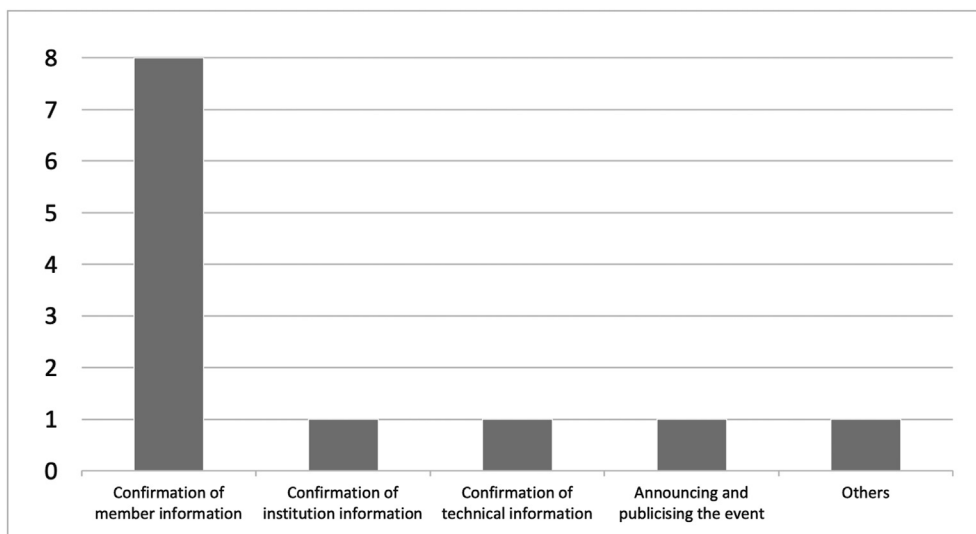

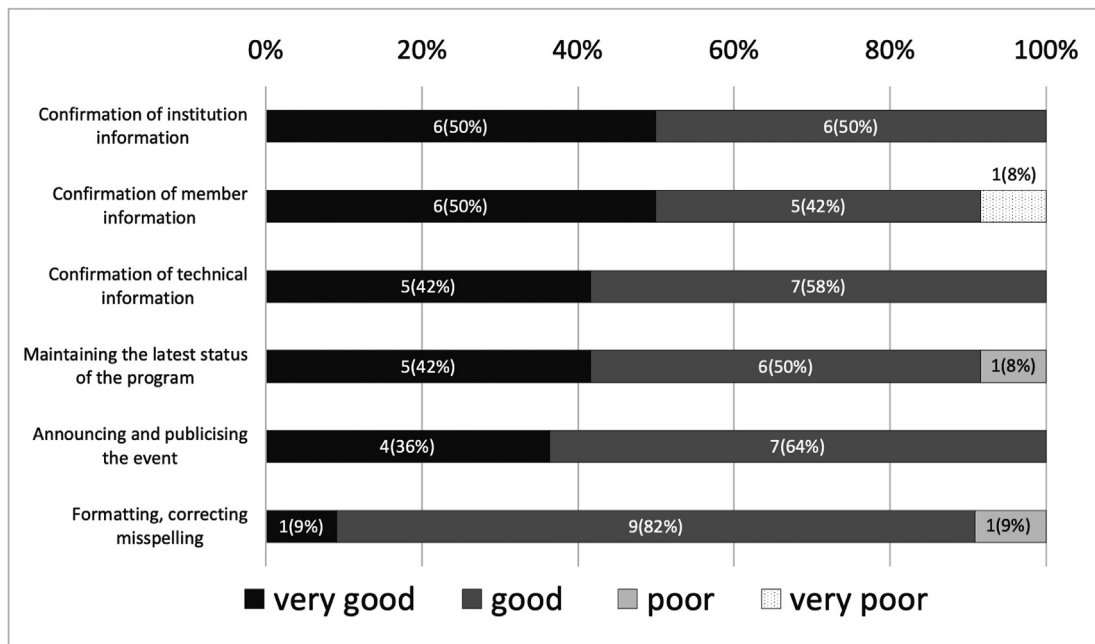**Figure 4.** Most burdensome tasks in managing a program (n = 12).

Figure 5. Evaluation of med-hok (n = 12).

separately. In addition, the study confirmed the system's effectiveness in managing participating institutions and members, which was previously the most cumbersome task for organizers as the number of participating institutions and members was increasing and their management was becoming increasingly difficult. Once the information of an individual is updated, a shared database automatically updates changes in all other programs. With the med-hok system, organizers can manage contact lists sorted by institutions that show the local time of the participants — this is a requirement for inviting presenters and planning a program. Our database system centralizes information that requires confirmation and makes it easy to search for contacts.

The user experience was also positively rated in all aspects, although the hedonic quality was evaluated to be lower than practical quality. This is because the system is merely a tool for program management, as posited by Hinderks et al. [21]. To improve hedonic quality in future versions, we must enhance the system's ease of use and incorporate elements of comfort and enjoyment. Further requests for usability improvements were made in the open-ended comments. The system requires additional features such as alerts and reminders to prevent mistakes and the implementation of an auto-complete function that would replace the selection of items from a drop-down list. The comments also included a request for facilitating authorization to select all members registered at an institution as the existing system only allows the selection of members authorized by the APAN-MWG secretariat. This issue will be re-examined by organizing access privileges among the secretariat and program administrators within the APAN-MWG. Appropriate control of member access would also help organizers contact suitable speakers and moderator candidates for the planned program, thereby enhancing the conference's quality. However, fewer respondents preferred med-hok for formatting and correcting misspellings than for other items. med-hok is a database system that allows the unification of items and systematic storage but does not allow for the correcting of
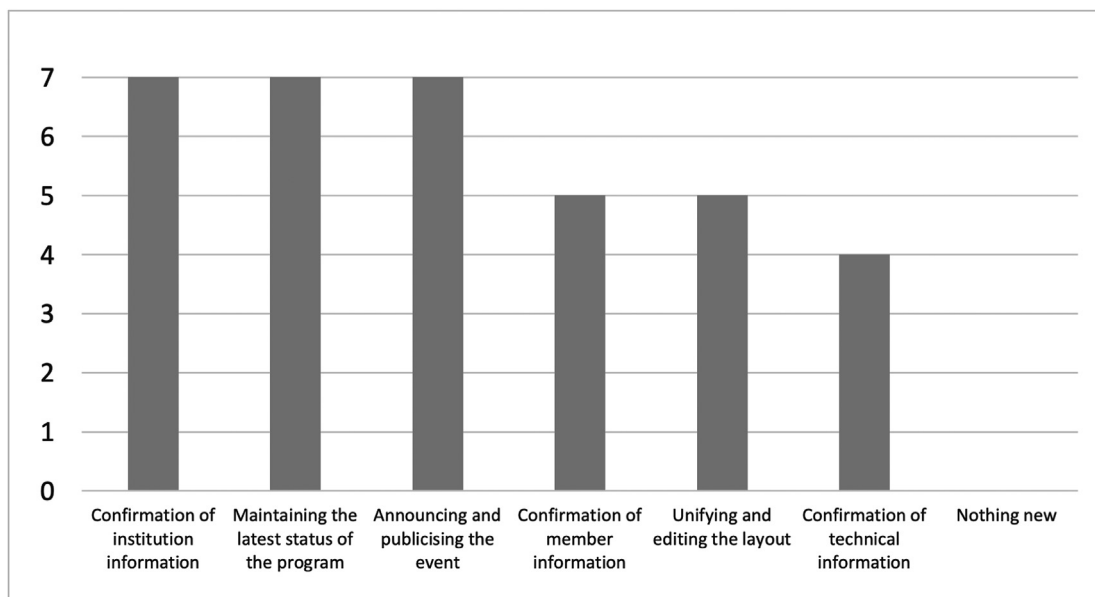

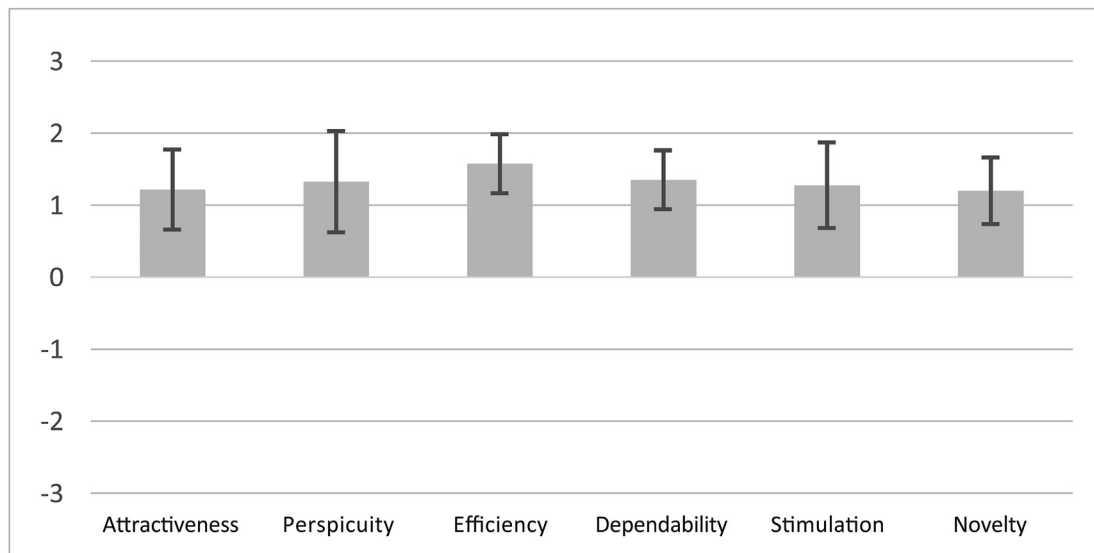**Figure 6.** New tasks enabled with the use of med-hok.

Figure 7. UEQ Scales of med-hok (n = 12). Error bars, 5% confidence interval.

misspellings of member and institution names. We must develop a system that can prevent these errors by providing a predictive conversion function.

There were several limitations in this study. First, it was based on APAN-MWG and may not reflect other international telemedicine networks, so we are unable to apply the findings to regions excluding the expansive Asia-Pacific region. This indicates a potential selection bias. Therefore, although the study's findings are important for the Asia-Pacific regions, they may not be as significant for other regions. Second, the number of respondents was low because we focused on event organizers who use med-hok; a more comprehensive evaluation in the future would require that the system be introduced to many program organizers. We would like to spread the use of the med-hok system globally. Third, there was no comparative analysis between the conference organizers who have used the system and those who have not. A comparison of conference organization before and after the use of the system should also be conducted for an objective evaluation. In addition, there has been no formal comparison of the system with existing systems or workflows because of the limitations of similar systems or activity reports. However, this research study is significant as it is one of the few evaluations of international telemedicine conference program management systems, which are still not commonly used. In recent years, online academic conferencing has become more popular, and it has been reported that it is less expensive to conduct online congresses than traditional in-person meetings [3, 25, 26]. However, a typical online conference management system costs thousands of US dollars per meeting, and organizers in the network are not able to share information about the registered members and their institutions. There are administrative barriers to conducting regular international telemedicine conferences, especially at medical institutions, and further research on dedicated and low-cost ICT-based infrastructure is needed in the present COVID-19 era.

5. Conclusion

This study focused on the administrative tasks undertaken to organize international telemedicine conferences, which have not been well documented in past studies. It explored the organizers' functions, conducted an evaluation of the management system, and found that most conference programs were managed by physicians and technicians and that member management was particularly time-consuming. The system developed in this study was effective in managing participating institutions and members, keeping the information up-to-date, and sending notifications. Therefore, the user experience of the system was observed to be immensely positive. Unlike that of academic conferences, many of the tasks involved in organizing international telemedicine education programs are handled by physicians and technicians, without the support of operating funds or staff. Therefore, the international telemedicine network must implement an administrative support system to conduct program operations efficiently.

Declarations

Author contribution statement

Kuriko Kudo: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Tatsuro Kudo: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Shintaro Ueda: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Yasuaki Antoku: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data.

Shunta Tomimatsu: Performed the experiments; Analyzed and interpreted the data.

Ho Shiaw-Hooi: Performed the experiments; Contributed reagents, materials, analysis tools or data.

Yukiko Hisada: Performed the experiments.

Shuji Shimizu and Tomohiko Moriyama: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

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