Research article

Development of a telemedicine group educational program for patients with heart failure: A delphi study

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A R T I C L E   I N F O

A B S T R A C T

Aims: Evidence regarding the most effective and feasible videoconferencing group educational program for patients with heart failure is still equivocal. This study aimed to reach consensus about the structure, acceptability, and feasibility of videoconferencing for people with heart failure in Jordan that improves access to healthcare and clinical outcomes.
Methods: There were two Delphi survey studies of three rounds each. Delphi one survey involved 32 healthcare staff, experienced in heart failure clinical practice and telehealth, to obtain a consensus of opinion on a proposed group videoconferencing program for patients with heart failure. Delphi two involved seven staff of the information technology center, experienced in videoconferencing and using supporting applications, to obtain their consensus on the current capabilities of the healthcare system and patients about information technology. Descriptive statistics were used for each item to determine whether consensus was achieved or not. Items that received 80% disagreement or 80% agreement of participants were not presented for re-rating in the third round, while the items that scored varying degrees of agreement were presented for experts for re-rating.
Results: In Delphi one a group of items reached consensus regarding structure, factors influencing, and effectiveness of the videoconferencing program. In Delphi two, the findings indicated that videoconferencing modality is applicable and feasible in Jordan.
Conclusion: This is the first study that addresses the equivocal evidence for the design and implementation of heart failure videoconferencing programs. The framework of the current

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proposed program can be utilized as a guideline to test or develop a future videoconference program.

1. Introduction

Heart failure (HF) has been defined as a global pandemic as it affects nearly 26 million people worldwide, is growing in prevalence and imposes a substantial health burden on patients [1]. Despite advancement in treatment and prevention, the burden of disease is significant [1]. Self-management is an important treatment strategy for patients with HF. A recent study on developing a patient-centered HF management program tailored to the Jordanian context and patients' needs identified three main elements that should be delivered to patients across the continuum of care: targeted education, psychological support and social support [2]. The importance of group discussion in these three elements was highlighted by both HF clinicians and patients [2].

However, participation rates in face-to-face HF education is problematic, particularly in light of the current COVID-19 pandemic [3, 4]. This supports the use of telehealth technology modalities to avoid physical contact and minimize the risk of COVID-19 transmission [3,4]. One such modality is videoconferencing, the connection of two or more people from different locations in real-time using two-way audio and video transmission [5] that can simulate face-to-face contact [6].

Videoconferencing, can be effective in the delivery of healthcare for people with chronic conditions (such as HF) with restricted mobility or living in remote and rural areas [7]. It can improve knowledge, self-care, quality of life, treatment compliance, self-efficacy, and utilization of healthcare [5,6,8,9]. Furthermore, videoconferencing can help reduce readmissions, length of stay, pain, and psychological distress (anxiety, depression) while improving access to healthcare and reducing costs and educators' time [5,8,10,11].

Facilitators to videoconferencing in healthcare, include: high internet speed, patients' and clinicians' training, availability of devices (eg personal computer, mobile phone, tablet), system ease of use, and providing technical support and appropriate system management [6,12]. Flexibility in terms of choosing a convenient time, tracking patients, monitoring treatment progress, and evaluating patients in a timely manner also maximizes benefits from videoconferencing [6,12]. Unfamiliarity with technology, unskilled healthcare providers, poor body language, concerns related to patients' security and privacy, and the need for face-to-face physical examinations are barriers to adopting videoconferencing in health [6,12].

In Jordan, there were 6.87 million internet users in 2022, accounting for 67% of the population with a 29.7% increase in download speed [13].

A review of systematic reviews on HF found equivocal evidence regarding the optimal structure for HF group videoconferencing [9]. In addition, evidence relating to the implementation challenges and ethics of these consultations between healthcare provider and patients is still lacking [9]. Research is needed to investigate the structure, acceptability, and feasibility of videoconferencing for people with HF, and how it is best implemented to suit both patients' needs and existing healthcare infrastructure and current information technology (IT) [9]. This study aimed to reach consensus about these attributes from the perspectives of the providers of HF healthcare and information technology experts.

2. Methods

2.1. Study design

There were two Delphi survey studies of three rounds each, which were performed from October 2020 to March 2021. The present study used a classical Delphi method, which starts the first round with an open-ended questionnaire, in which experts indicate their information, perspectives and ideas regarding a particular issue [15–17]. Then ideas of panelists are used to create a structured questionnaire for rating/ranking in the subsequent rounds [15]. After round three, consensus agreement/disagreement with generated items is identified [15,18]. This approach was found to be acceptable and appropriate in order to reduce bias associated with predetermining contents when generating contents/ideas from literature review [16].

The Delphi method was used in the present study for various reasons. Firstly, Delphi-related characteristics including: iteration, controlled feedback, and statistical group response assist participants with giving and changing (after receiving feedback) their perspectives/ideas freely [19,20]. Secondly, this method is especially appropriate for generating ideas regarding unexplored topics that have knowledge gaps [20]. Third, the online Delphi technique is suited when an in-person discussion is impractical, particularly when the panelists are geographically dispersed [20]. Lastly, the web-based Delphi studies can help maintain participants anonymity, which encourages, independent opinions, honesty, and ultimately minimizes the risks associated with group dynamics such as coercion or manipulation to conform with a particular or dominant opinion [21,22].

The first Delphi survey involved healthcare staff from a large university affiliated hospital in Jordan to obtain a consensus on a proposed group videoconferencing program for patients with HF. The second Delphi study involved staff of the information technology center, located in the same university hospital, to obtain their consensus on the current capabilities, needs, barriers and facilitators affecting the use of videoconference modality.

In the first round of Delphi one, the aim was to explore participants' perspectives and opinions relating to videoconferencing program [15–17]. The purpose of the second round was to identify their levels of agreement on the items derived from the first round. Items resulting from the first-round analysis were summarized, listed, and rated (5-point Likert scale) in order to provide input and develop the second-round questionnaire [15]. Participants were asked to indicate their level of agreement with items using a five-point

Likert scale ranging from 1 ('strongly disagree'), 2 ('disagree'), 3 ('neutral response'), 4 ('agree') to 5 ('strongly agree'). In the third round, participants indicated their level of agreement on items derived from the second round. However, items that received 80% disagreement or 80% agreement of participants in round two were not presented for re-rating in the third round [23–25]. In the third round, the second-round results of each item (the percentage of agreement and disagreement) were displayed beside each item [15, 18]. For example: 65% of participants 'agreed' with the item in the previous round, and 23% of participants 'strongly agreed' with the statement. All the experts who completed the second-round questionnaire were invited for the third and final round. In Delphi two, a similar approach was used to determine participants' level of agreement with the information technology factors/issues affecting the use of videoconference modality.

2.2. Sample

2.2.1. Delphi one

As HF management/education is multidisciplinary, a purposive sample of 32 healthcare providers, working in a large university affiliated hospital in the north of Jordan from a diversity of health disciplines was selected to participate in this study (Fig. 1). Despite the use of only one healthcare setting, this hospital is the largest healthcare center in the region, serveing nearly one million people from five major governorates including Irbid, Jerash, Ajloun, Mafraq, and Amman. Additionally, about ten outpatient cardiac clinics, operrated by consultant cardiologists, are run every week. The healthcare staff working in this hospital are faculty members of the Jordan University of Science and Technology, Jordan Ministry of Health, and the Royal Medical Services, and this diversity helps ensure representation of the study sample and generalizability of the results.
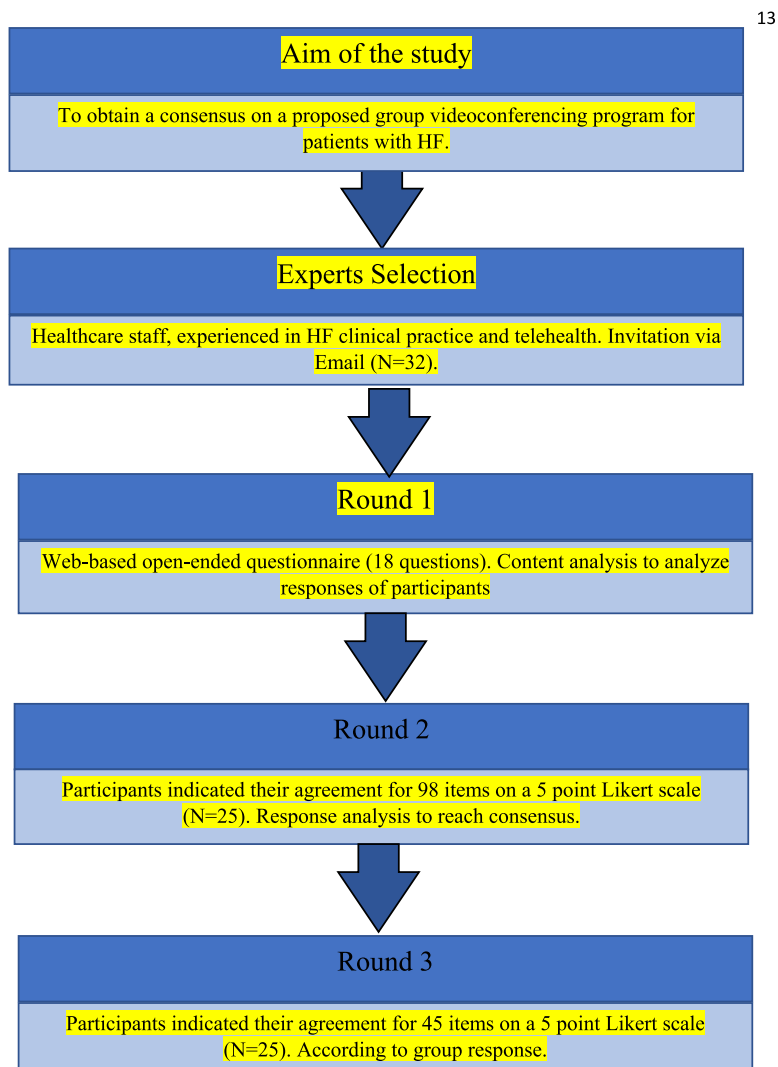

Aim of the study
To obtain a consensus on a proposed group videoconferencing program for patients with HF.

Experts Selection
Healthcare staff, experienced in HF clinical practice and telehealth. Invitation via Email (N=32).

Round 1
Web-based open-ended questionnaire (18 questions). Content analysis to analyze responses of participants

Round 2
Participants indicated their agreement for 98 items on a 5 point Likert scale (N=25). Response analysis to reach consensus.

Round 3
Participants indicated their agreement for 45 items on a 5 point Likert scale (N=25). According to group response.

Fig. 1. Overview of Delphi one.

The Delphi one study enrolled 32 participants for several reasons including: HF care is delivered by multiple health disciplines from varied clinical and knowledge backgrounds, complexity of HF care, avaiability of the human resources where the study was conducted, and to ensure generalizability of the study results [26–28]. Additionally, the litreature indicated that the sample size of 30–50 panelists in Delphi studies is optimum for complex health issues that require varied health staff representation from different specialties and backgrounds [26–28].

The inclusion criteria for both Delphi studies were: HF clinical experience, at least three years of HF clinical practice, experience with telehealth, and sufficient familiarity with the local context to clearly elucidate the potential videoconferencing HF interventions and the factors influencing its uptake and implementation.

The administrator of the hospital's medical department was given the inclusion criteria and provided the participant information sheet to eligible healthcare providers via email.

The consenting participants included: cardiologists (consultants) (n = 6), senior internal residents (n = 11), fellows in cardiology (n = 4), cardiac nurses holding master degree (n = 6), pharmacists (n = 3), and physiotherapists (n = 2). A reminder was sent via phone and email to the participants who did not complete the electronic questionnaire after one week, and a second reminder was sent ten days later. Face to face meetings were avoided to ensure compliance with COVID-19 social distancing practice, prevent the monopolization of a particular opinion and keep the responses anonymous.

2.2.2. Delphi two

A purposive sample of seven participants from the information technology center, located in the same university affiliated hospital, was selected to participate. The inclusion criteria were: experience in videoconferencing and using supporting applications and at least a bachelor's degree in information technology/computer. The researcher provided the inclusion criteria to the administrator of the information technology, who then sent the information sheets to eligible staff.

Although no standard sample size was reported for Delphi studies [26], only seven panelists were recruited due to the involvement of participants from the same specialty and practice backgrounds (homogeneous sample), and simplicity/clarity of the issue [26].

2.3. Ethical considerations

The study was approved by the Institutional Review Board of a large affiliated hospital, where the study was performed (March 13,

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Box 1
Delphi one Questions in round 1.

Structure and design

What do you think the structure and design of the program should be in terms of:

- numbers of patients and health professionals,
- types of health professionals,
- dose and amount of education,
- frequency of sessions,
- length of each video/session, topics/contents for discussion,
- duration of this program,
- Who should lead (manage) this meeting?

Factors affecting/influencing the program

- What do you think the barriers/challenges to use/implement this program?
- The roles of the session leader or manager?
- How should be the leader or manager of the video session?
- Do you think that videoconferencing group sessions vary by patient characteristics such as specific chronic medical conditions and severity of disease, or age?
- What do you think the core components or factors that make this strategy more valuable?
- What are the best ways to improve patient's satisfaction and acceptability of this intervention?

What are the most appropriate approaches to enhance feasibility and applicability of this intervention?

Impact or effectiveness of this innovative communication mode

- Do you think that this modality can improve patient's satisfaction, health professionals' satisfaction, patient's knowledge, self-care, adherence, and quality of life? How? And why?
- What do you think is the impact of VC on access to healthcare services?

2274). Participants' confidentiality, privacy, anonymity were maintained during sampling, data collection and analysis. Signed consent was obtained through email before performing both online Delphi studies. The data collected were stored in a computer secured by password and inaccessible to others.

2.4. Data collection

2.4.1. Delphi one questionnaire

In the first round, thirty two participants outlined their opinions relating to the program using an open-ended online questionnaire [15–17], which was developed according to extensive search of systematic reviews and primary research targeting videoconferencing HF programs [5,7–9,11,29] (Box 1).

Eighteen open-ended questions were distributed across three main sections (Box 1). Those included structure and design of videoconference program (eight questions), factors influencing the program (seven questions), and impact of this innovative communication mode (seven questions) (Box 1). In order to prevent any potential bias and ensure clarity, the open-ended questionnaire was carefully checked by the authors of this study, prior to sending it to the participants.

The second-round electronic questionnaire had the same eighteen questions used in round one. The 98 new items, derived from the first round analysis, were added under the same three headings (Fig. 1). Of the 32 participants approached, only 25 participants agreed to take part in the second-round. The 'structure and design', 'factors influencing program', and 'impact of videoconference' sections had 46 items, 45 items, seven items, consecutively.

A modified version of the second-round questionnaire was used in the third Delphi round. The items included were mostly from the "structure and design of the videoconference program" section (32 items), eleven items were from the "factors influencing" section, and two from "the impact of videoconference" section (Fig. 1).

2.5. Delphi two questionnaire

In the first round, the seven participants indicated their opinions relating to the current capabilities, needs, barriers and facilitators of the healthcare system (providers) and patients (users) about information technology in Jordan. The electronic questionnaire included six open-ended questions (Box 2).

In the second round, an electronic questionnaire consisting of 23 items were derived from the first-round analysis (Fig. 2). The second-round electronic questionnaire had the same six questions used in round one. The same seven participants approached agreed to take part in the second-round. For the third Delphi round, a modified version of seven items from the second-round questionnaire was used.

2.6. Data analysis

2.6.1. Delpi 1 and delphi 2

Content analysis was used to analyze responses of participants in the first-Delphi round for subsequent re-rating in rounds two and three [15,18]. For each Delphi survey, the entire text, derived from the first round, was studied by two researchers separately and all their codes were extracted. The extracted codes were then reviewed in a single session and similar cases were written; in the case of different cases, a final agreement was reached. Then, all codes were assigned to identify sub-themes and related themes, and finally, attributes of group videoconferencing program were identified based on healthcare staff responses and capabilities, needs, barriers and facilitators affecting the use of videoconference modality were identified based on responses of the information technology center staff. The percent agreement/disagreement of participants was defined to be 80% or above to indicate their re-rating consensus in rounds two and three [23–25]. The agreement percentage was determined according to Fink, Kosecoff [30] which indicated that research team evaluates the importance of study problem and then defines cutoff for consensus. For analysis, descriptive statistics (percentage) were used for each item to determine whether consensus was achieved or not [15,18]. The same procedures as in round two were applied for analysis in round three. The same procedures as in Delphi one were applied for analysis in Delphi 2.

Box 2
Delphi two Questions in round 1.

- What are the current capabilities of Jordan healthcare system to use videoconference group strategy for people with HF?
- What are the hardware and internet connectivity requirements for patients to appropriately access videoconference?
- Approximately what proportion of the population of HF patients has appropriate access to hardware and internet connectivity
- What are the needs requried to effectively/successfully employ this strategy?
- What are the barriers of using this type of information technology modalty?
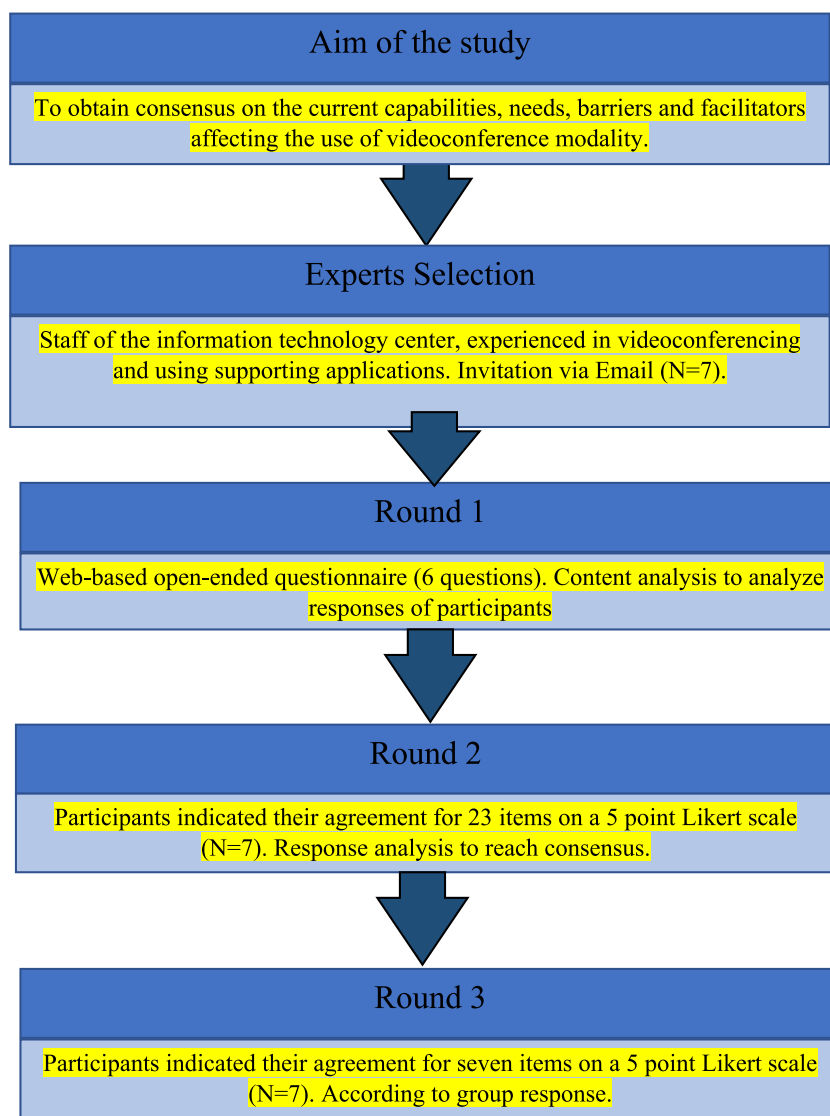- What are the facilitators of the heathcare system (providers) and patients (users) about information technology?

Fig. 2. Overview of Delphi two.

3. Results

3.1. Delphi one

The study enrolled 32 participants, with a majority of males 27 (84.4). The mean age and years of experience for the study sample was 35.25 ± 7.62, 6.63 ± 4.40, consecutively.

Box 3 shows a list of all components, derived from the whole Delphi one, that are proposed to be incorporated in the videoconference HF program. For example, in the structure and design section, consensus was achieved with the third round for the number of participants who should be involved in each session to be five participants (Box 3).

Table 1 shows a summary of items for the three sections. From the second and third rounds, the total number of items that achieved consensus for the three sections was 65 of 98 items (66%), with 56% (n = 55) of the items in round two (Table 1). The percentage of items that reached consensus varied between sections. In round two 55 of the 98 (56%) items achieved consensus for the three sections; and were excluded from round three. For the structure and design section, 14 of the 46 items reached consensus in Round 2 (30.4%); by Round 3 only seven items reached consensus (22.6%), and twenty five items did not reach consensus. For the factors influencing the program section, consensus was achieved 80% (n = 36 of the 45 items in Round 2; by Round 3, the percentage of items where the consensus was achieved was 18.1% (n = 2 of the 11 items). Seven items could not be agreed upon by expert panel (Table 1).

Box 3
All consensus statements, derived from Delphi one, for videoconference HF program

Structure and design section

- Only 5 patients should be in each videoconference session
- Should vary according to patient's needs, topics, psychological status, patients' characteristics such as age and level of education.
- Education should start gradually from a low volume and simple topics to greater amounts and more advanced, varying according to severity of the disease and need further evaluation, and according to HF classification: Class I & II (every three months), class III & IV (monthly)
- Length of each session should be 30 min.
- Duration of program should be lifelong
- Cardiologist and/or cardiac nurse should participate in the session.
- Topics that should be delivered according to patient's needs: Diet, medication adjustment, exercise, lifestyle change, fluid status, and smoking.

Factors affecting/influencing the program section

- **The best ways to improve patient's satisfaction and acceptability of this intervention include:**
  - ✓ Establishing a rapport between patients and healthcare providers (trust and respect)
  - ✓ Reminders should be sent to patients prior to meeting
  - ✓ Choosing time suited/convenient for all patients to meet
  - ✓ Involvement of cardiologist in the session.
  - ✓ Cardiologist should explain the benefits/of this strategy to patients in terms of its impact on self-care, need for hospital vista, reducing travel burden, improve access to healthcare services, prevent complications.
- **The barriers/challenges of using videoconferencing strategy**
  - ✓ Usability of technology
  - ✓ Absence of physical exam and vital signs
- **Roles of healthcare provider during the session**
  - ✓ Providing general education,
  - ✓ Only focusing on patients' needs, questions, and preferences
  - ✓ Encouraging interaction
  - ✓ Checking patients' compliance to medication and self-care
  - ✓ Taking feedback to check whether patients have learnt and benefited from sessions
  - ✓ Checking if patients have alarming symptoms or if they need hospital/ER visit
  - ✓ Providing emotional and psychological support
  - ✓ Educate patients when to seek medical attention
- The healthcare providers who are going to lead (run) the session should have patience, communication skills, presentation skills, and should be practical, passionate and sympathetic, responsive, experienced in HF and teaching, and familiar with telehealth.
- **Factors that add value to this strategy**
  - ✓ Involvement of caregiver/family member in the session
  - ✓ Using simple and clear language with patients
  - ✓ Establishing a rapport (trust and respect relationship) between healthcare provider and patients.
  - ✓ Taking frequent feedbacks from patient during sessions to assess the impact of this strategy on their health outcome and self-care, and readmissions.
  - ✓ Acceptance of this intervention
  - ✓ Allowing patients to share their complaints, feelings, and care plans (encouraging interaction).
- **The appropriate approaches to enhance feasibility and applicability of this intervention include**
  - ✓ Using the same free videoconference application on mobile or computers which are easy to use and in simple language.
  - ✓ Encouraging patients who can afford to buy electronic pressure device and weight scale, so the patients can have the readings (BP, O2 sat, and heart rate) and weight prior to session.
  - ✓ Teaching patients how to use this technology prior to starting this intervention.
  - ✓ Marketing the importance of this intervention through social media, conferences, TV.
  - ✓ Public hospitals in collaboration/support of cardiologists can seek support of large health organizations in Jordan to facilitate implementation of this strategy such as Ministry of Health.

Effectiveness of this innovative communication mode

- Videoconference strategy can improve patients' satisfaction, knowledge and self-care, adherence, healthcare provider satisfaction.
- Videoconference strategy can reduce travel cost, burden on patients, workload on cardiologist, and reduce clinic visits particularly for stable patients.
- Videoconference can improve access and frequency to healthcare services

Table 1
Summary of items in each section In Delphi one.

Sections	Number of items in each section		Percentage of items that reached consensus (n)		Percentage of items that reached consensus (n) in both rounds
	Round 2	Round 3	Round 2	Round 3	
1. Structure and design	46	32	30.4% (14)	22% (7)	45.7% (21)
2. Factors affecting/influencing the program	45	11	80% (36)	18.1% (2)	68% (38)
3. Impact or effectiveness of this innovative communication mode	7	2	71.4% (5)	50% (1)	85% (6)
Total	98	45	56.0% (55)	24% (10)	66% (65)

3.2. Delphi two

The study enrolled seven participants, with a mean age of 42.42 (4.24), and the majority were males 5 (71.4%). The mean years of experience was 15.43 (4.61). Box 4 shows a list of statements that reached consensus regarding the current capabilities, needs, barriers and facilitators affecting the use of videoconference modality in Jordan. For example, the current capabilities of Jordan healthcare *system* included availability of devices (computers and laptops), computer engineering programs, internet access, and expert computer

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Box 4
Agreement consensus on the current capabilities, needs, barriers and facilitators affecting the use of videoconference modality in Jordan

The current capabilities of Jordan healthcare system to use videoconference group strategy for people with HF

- Devices required for this strategy are available in Jordan such as computers, laptops, i pads,
- Most people in Jordan, particularly those aged between 20 and 60 years use smart phones and had internet access
- Computer engineering programs are available
- Expert Computer engineers are available in Jordan
- Videoconference strategy can be implemented in Jordan healthcare context
- Internet access is available in Jordan

The hardware and internet connectivity requirements for patients to appropriately access Videoconferencing strategy

- Laptop or desktop with camera
- Tablets such as i pad with camera
- Smart phones
- Older people who do not have smart phones and internet access can use this technology through assistance of other family members

Needs required to effectively/successfully employ this strategy

- Easily used/usable application that is clear, simple to use and requires only one request to log in such as ID number.
- Information technology expert should teach patients in groups on how to upload, use the application prior to starting sessions.
- Speed and quality of internet access across Jordan cities and towns should be assessed to identify which internet company to use
- Employing an Information Technology expert specifically to answer calls relating to the use of videoconference strategy

The barriers of using this type of Information Technology modality

- The voice is cutting off (breaking up) due to reduced speed/quality of internet signals
- The ability to handle the technical issues during session can be difficult in some patient groups
- There is still another proportion of people who do not use these devices. Those can visit cardiac clinics

The facilitators of the healthcare system (providers) and the patients (users) about Information Technology

- Training for both patients and clinicians
- Creating clear, easy to use, and free applications
- Providing technical support
- Adequate internet speed and available hardware devices required for this modality.

Table 2
Summary of statements in each domain in Delphi two.

Dominos derived in Round 1	Number of statements in each domain		Percentage of statements that reached consensus (n)	
	Round 2	Round 3	Round 2	Round 3
1. The current capabilities of Jordan healthcare system to use videoconference group strategy for people with HF	7	4	42.9% (3)	100% (4)
2. The hardware and internet connectivity requirements for patients to appropriately access Videoconferencing strategy	3	0	100% (3)	0
3. Proportion of the people who have appropriate access to hardware and internet connectivity	2	2	0	0
4. Needs required to effectively/successfully employ this strategy	4	1	75% (3)	100% (1)
5. The barriers of using this type of Information Technology modality	3	0	100% (3)	0
6. The facilitators of the healthcare system (providers) and the patients (users) about Information Technology	4	0	100% (4)	0
Total	23	7	69.6% (16)	71.4% (5)

engineers required to use videoconference strategy. The experts also indicated the following requirements to effectively employ this strategy: using simple applications, teaching patients how to upload and use these applications and employing an information technology expert specifically to answer calls relating to the use of videoconference strategy.

The results showed that 16 (69.6%) of the 23 statements reached expert consensus in round 2, and five (71.4%) of the seven items in round 3 (Table 2). For the current capabilities domain, consensus was achieved on three (42.9%) of the seven statements. Regarding the hardware and internet connectivity requirements domain, all of the items reached consensus in the second round. Most of the statements relating to the needs, barriers, and facilitators domains achieved consensus. For more details, Table 2 shows the list of responses (statements) to each domain.

4. Discussion

The use of a videoconferencing group educational program may help patients with HF particularly those who are newly diagnosed, live in a remote area, or have any restricted mobility due to their medical condition or the pandemic lockdown [2,7,31]. The consensus perspectives of healthcare providers and information technology center staff about HF videoconferencing programs from separate Delphi studies can inform program design and implementation.

4.1. Healthcare providers' perspectives toward HF videoconferencing programs

Structure and design. The program should involve small groups of five patients with sessions tailored to patients' needs and a gradual increase in complexity of educational content. Benefits will be maximized by only including groups with similar problems [7]. Patient involvement and engagement with treatment regimens can be enhanced if healthcare providers provide information tailored to the patients' needs, and emotional support in real-time feedback [2,6].

According to the healthcare providers, a 30 min duration session either monthly (Class III and IV) or every three months (Class I and II) is appropriate. Disease severity and prior face-to-face training may influence both the session's duration and frequency [6,29,32].

Telehealth can be useful for patients with HF who cannot attend face-to-face clinics due to their condition or restrictions of the pandemic [2,4,7,31]. This study has also shown that benefits may also be realized post COVID-19 pandemic.

Consensus from healthcare providers about multi-disciplinary involvement of cardiologists and cardiac nurses is recognized as a key to the success of telemedicine [6]. Consensus topics such as diet, medication adjustment, exercise, lifestyle change and fluid status reflect the literature [33] Furthermore, quitting alcohol, weight control, and blood pressure control may be also involved in such programs [33], although these were not considered uniformly important in this study.

Factors influencing the program. Establishing rapport, using reminders, involving cardiologists, and discussing patients' needs will enhance the patient acceptability according to healthcare providers. Accessibility to a specialist, good communication skills, and flexibility and convenience are major drivers for the success of videoconferencing [6].

There was consensus that the usability of technology may act as the main barrier for implementing a videoconference strategy. The usability of videoconference technology may be enhanced through the use of simple software apps, technical support, and frequent training for patients [6,29,32,34].

This study identified that it was essential for the healthcare providers educator to promote interactivity, be responsive and supportive. A leader/facilitator who ensures that clinician-participant interaction in videoconference strategy can improve learning outcomes [35]. A number of other 'soft skills' are required, in particular, communication and presentation skills and ability to combine the clinician and educator roles. The involvement of family members [36–38], allowing patients to share their complaints, and having a database for all invited patients can add value to the program.

Patients participating in the videoconference strategy should prepare their readings of weight, heart rate, blood pressure, and oxygen saturation before the planned sessions. Healthcare centers should introduce these services in easy application, train all patients and healthcare providers on this service, and market for these services in collaboration with other stakeholders through social media,

television, and conferences [6,29,32,34,39].

Effectiveness of the proposed program. The healthcare providers proposed that a videoconference program could improve patients' satisfaction, knowledge and self-care, and adherence with therapy plans. Healthcare providers can assist with enhancing patient adherence and compliance to medication, diet, and exercise [40,41]. These measures may allow patients to gain insight into self-care practices, reduce unnecessary hospitalizations and visits to an emergency room, and enhance functional health status [40].

The use of videoconference can also enable healthcare providers to identify patients who experience HF deterioration or report any severe symptoms that may require prompt medical intervention [41]. Safety-related health issues that can arise during the night can also be handled [41]. Telemedicine can increase the productivity and cooperation of medical healthcare providers which ultimately enhances the quality of care [42]. Studies demonstrated that the use of videoconference can decrease follow-up visits, which makes it more cost-effective [43,44]. Improving access and reducing healthcare expenditures for both patients and healthcare providers is a major driver to adopt/accept videoconference [4–6].

4.2. Perspectives of information technology experts toward videoconference group educational program

Capabilities of the Jordan healthcare system. The current capabilities of the Jordan healthcare system included availability of devices (computers and laptops), computer engineering programs, internet access, and expert computer engineers required to use videoconference strategy in Jordan. These findings are supported by the 2019 statistics released by Jordan's Telecommunications Regulatory Commission: 77% of people use a mobile and 81% have internet access [45]. Cost is the main barrier to internet access [46]

Hardware requirements. Computers (desktop or laptop), tablets, or smartphones can be used to access videoconferencing appropriately. A smartphone is the most likely device to be used [45]. Older people who do not have smartphones and internet access can use this technology through the assistance of other family members.

Needs and Barriers. There was a concordance between the healthcare providers and information technology center participants about what was needed to successfully implement videoconferencing technology and address barriers. Participants recommended using simple applications, teaching patients how to upload and use these applications, employing an information technology expert specifically to answer calls relating to the use of videoconference strategy. Better collaboration between the healthcare system, Jordan TRC, internet providers, and other stakeholders could facilitate videoconferencing [39]. Although the majority of Jordan's population (90%) is covered by 4G technology [47], poor internet connectivity is a significant barrier to telehealth [6]. Inability to handle technical issues is another barrier; however, training of patients and/or family members will minimize the effect of the limited capability of certain patients to launch and deal with applications or software [6,32].

Facilitators. The facilitators identified by health Information Technology experts reflected previously identified issues for both patients and clinicians, for example, training and support, and the availability of fast internet and appropriate hardware. These issues are widely reported in the literature [6]

4.3. Strengths and limitations

To our knowledge, this is the first study of its kind conducted in Jordan. This study considers the perceptions of two groups of populations: healthcare providers that work with patients with HF and Information Technology experts. The opinions of healthcare providers are crucial in developing this program since they were aware of the needs and the journey of HF patients. The opinions of information technology experts were helpful in providing information about certain technical pitfalls that may limit the applicability of the videoconference strategy and directions of how to mitigate the effects of these pitfalls. The Delphi method has distinctive features including holism, verifiability, flexibility, and controlled feedback process [20]. In addition, the use of several rounds allows panelists to reassess their judgments/views provided in the previous rounds, which eventually assists with improving data validity [20]. Online-Delphi process also helps in connecting diverse panelists from different geographical areas, saving time and cost, and managing data [20].

There were several limitations in our study. First, the opinions of patients with HF about the videoconference group educational program were not explored in this study. Second, both healthcare providers and health information technology experts were recruited from a single site, which precludes generalization of results. Future studies could involve healthcare providers and health Information Technology experts from other healthcare settings. Lastly, methodological limitations include: limited views, difficult generalization of the results due to the small sample size, and difficulty of determining what constitutes adequate consensus [20,48].

5. Conclusion

This study has identified consensus from healthcare providers and health information technology experts for a videoconference HF management program. Healthcare providers preferred sessions to be led by the cardiologists and cardiac nurses, with 30 min in duration, with a rich amount of information, moving from simple to a complex topic, and the dose of information and frequency should be varied according to the needs and severity of HF. Information technology experts revealed that a videoconferencing strategy could be applied in Jordan healthcare system if barriers and needs are appropriately addressed. The framework/structure of the current proposed videoconferencing HF program can be utilized as a guideline for future testing or developing a videoconference HF management program in Jordan.

Author contribution statement

Osama Alkouri, Tim Schultz: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.**Yousef Khader, Amina Al Marzouqi, Amr Zyoud, Mohamad Jarrah, Khaldoun Khamaiseh**: Analyzed and interpreted the data; Wrote the paper.**Ahmad Al-bashaireh**: Conceived and designed the experiments. Analyzed and interpreted the data.**Basheer Khassawneh**: Performed the experiments; Analyzed and interpreted the data.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare no conflict of interest.

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