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Successful implementation of ehealth interventions in healthcare: Development of an ehealth implementation guideline

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Abstract

Introduction: eHealth interventions have the potential to improve the quality of healthcare and reduce costs. However, to implement eHealth interventions successfully instruments are needed to facilitate this process. This study aims to develop an eHealth implementation guideline for implementation of eHealth interventions in daily practice.

Methods: In June and July 2019 a literature research was conducted and, subsequently, a two-round Delphi study including 13 international eHealth experts in the field of healthcare, ICT & technology, and research was performed. Within the Delphi study, experts scored specific determinants using an online survey. Based on mean scores and interquartile ranges (IQRs) in the online survey, consensus between the experts was assessed.

Results: A total of five domains (i.e., Technology, Acceptance, Financing, Organizational, and Legislation & Policy) with 24 corresponding determinants were assessed by the experts. After the second Delphi round, consensus was achieved on the five domains and 23 determinants (mean scores ≥ 8; IQR ≤ 2). Only for the determinant 'Evidence-Based Medicine' was no consensus reached (mean score < 8; IQR $= 2$). Based on the 23 determinants, the eHealth implementation guideline is developed for eHealth implementations in healthcare in order to increase their effectiveness.

Conclusion: The eHealth implementation guideline developed in this study may help healthcare providers/researchers assess the determinants of successful eHealth intervention prior to the implementation of the eHealth program

Keywords

Consensus, Delphi study, eHealth, eHealth implementation guideline, implementation

Introduction

Global healthcare costs have risen rapidly, US$7.8 trillion in 2017, and further increases in healthcare expenditures are predicted for the coming decades.[1] Solutions to reduce healthcare costs, and concurrently improve patient-relevant outcomes, are assessed in different healthcare settings using value-based healthcare (VBHC) as a primary strategy.[2–5] In this regard, much attention is given to the integration of eHealth into future healthcare systems in order to improve outcomes and decrease healthcare costs.[6–8] However, few eHealth programs have shown the desired effects on patient-relevant outcomes after implementation in practice. This may be due to the lack of successful implementation strategies and/or the inefficacy of the instruments.[9,10] Previous research[11–16] concluded that personal factors (i.e., attitudes of intermediates and/or end-users) or

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organizational factors (i.e., strategy or organizational support) might be important determinants of the success of implementation trajectories. However, those determinants are mostly assessed during and/or after the implementation of an eHealth intervention for evaluation purposes. This indicates the need for an implementation guideline for eHealth interventions that can be used before the start of such interventions, in order to increase their effectiveness in practice.

The most well-known and frequently applied theoretical framework for implementing innovations in various disciplines (e.g., technology, public health, communications, economics, history, political science, and education) is the 'Diffusion of Innovations Theory' of Rogers,[17] in which innovations often refer to new technologies.[18] Even though this framework is widely applied, one of the main points of criticism is that it is difficult to measure the exact effect of a newly applied technology,[19,20] especially in healthcare, which leads to inconsistent results. For that reason, previous studies[12,21] have suggested alternative instruments to assess the implementation of innovations or technologies in a systematic manner. The Measurement Instrument for Determinants of Innovations (MIDI) by Fleuren et al.[21,22] has shown to be a useable and generic diagnostic tool to assess the main determinants of successful implementation in healthcare and preventive care based on four domains (i.e., Innovation, Individual, Organization, and Social Political Context). Although the MIDI is a promising instrument to assess innovation in healthcare,[22] factors that are crucial for eHealth interventions such as finances,[11,12,23] evidence-based medicine,[12] and safety[11,12,23] are lacking. Those missing factors may explain the inconsistent findings regarding the effectiveness of its use in eHealth interventions, and stress the importance of developing an explicit tool to guide eHealth implementations (e.g., in order to increase their effectiveness) based on empirical and expert evidence.

To obtain the opinions of experts, a Delphi study has shown to be an effective methodology[24–27] to achieve consensus between expert groups on topics on which information is incomplete or unavailable.[26,28] Different rounds of feedback are organized in which international experts provide their knowledge and eventually reach consensus on the topic of attention. Useful characteristics[29] of Delphi studies include (1) experts respond to a specific topic in multiple feedback rounds, (2) a selection is made of the most useful form of communication (i.e., interview, (online) questionnaire, group decision support system), (3) a feedback mechanism is used, (4) experts with diverse backgrounds participate in the feedback rounds, (5) a step-by-step judgement is incorporated (i.e., insight into the other experts' feedback and the possibility to respond), and (6) the answers are statistically processed. Prior research[26,29] in various disciplines have already demonstrated the effectiveness and efficiency of developing (theoretical) models and/or instruments based on the results of Delphi studies, which may increase the likelihood of successfully implementing projects to support changes in healthcare.

In the present study a literature research and a Delphi study are performed with the overall objective to develop a guideline for the implementation of eHealth interventions in practice. Such a newly developed guideline may support effective implementation of eHealth interventions and, eventually, improve patients' outcomes and reduce healthcare costs.

Method

Study design

In the present prospective study, a literature research was performed followed by a two-round Delphi study by means of an international panel of experts from England and the Netherlands. The expert panel aimed to reach a consensus regarding the main determinants of success for implementing eHealth interventions or applications in the successive Delphi rounds. Based on the consensus of the international experts, an eHealth implementation guideline is developed in order to guide successful eHealth implementations in healthcare. In the present study, the term 'successful eHealth implementation' is used for the guideline to be developed, by which is meant that proven success factors are used for the guideline in order to increase the effectiveness of successful eHealth implementations in practice.

Empirical research

Between June and July 2019 a literature research was performed to evaluate the main determinants for implementation assessed in prior research using the following data libraries: PubMed, Medline, and Google Scholar. To find potentially relevant literature, the following entry terms were used in the databases: ((implementation AND eHealth) OR (implementation AND telemedicine) OR (implementation AND remote guidance) OR (implementation and screen care) NOT (early detection) NOT (early diagnosis) NOT (screening)). As indicated in Figure 1, this search strategy resulted in 721 potentially relevant literature sources. To select the most relevant literature on successful implementation of eHealth interventions, the titles and abstracts of these remaining publications were assessed by an independent researcher and, subsequently, a detailed assessment of the full texts was carried out, which resulted in 22 articles. Based on these articles, an overview of the main domains (i.e., Technology, Acceptance, Financing,

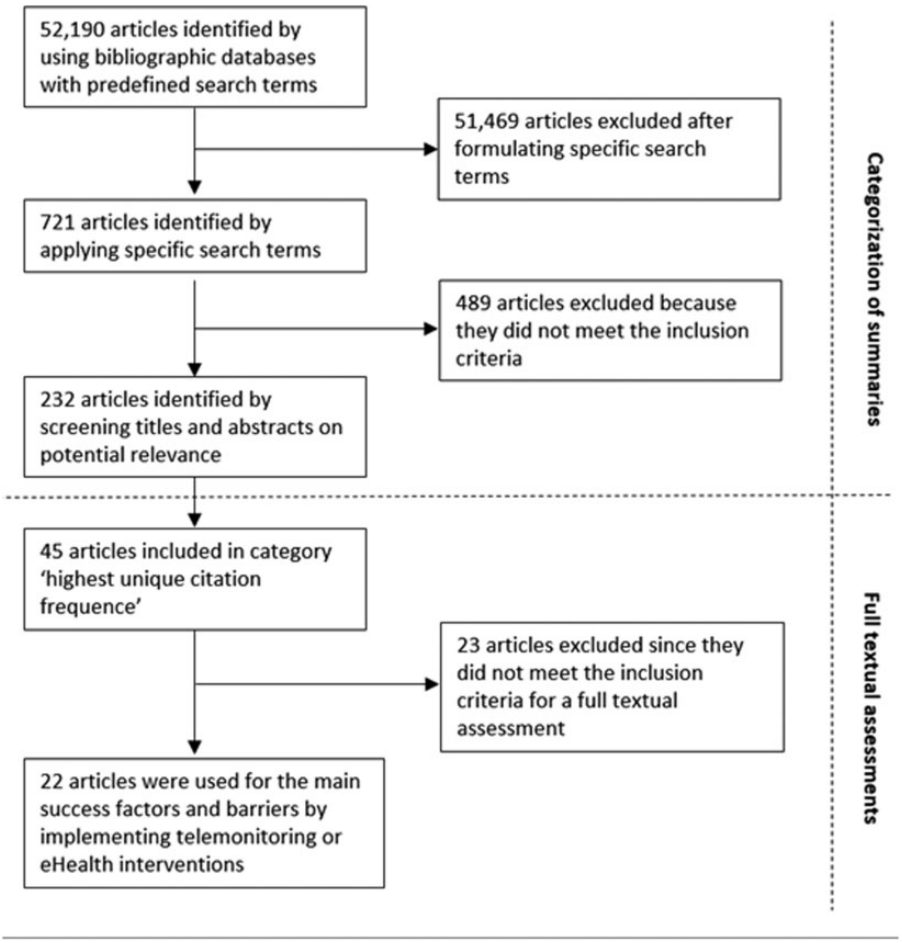

Figure 1. Results of the search strategy.

Organizational, and Legislation & Policy) and corresponding determinants of successful eHealth implementations was compiled in Table 1. The domains ($n = 5$) and determinants ($n = 20$) were used for the first round of the Delphi study and processed in an online questionnaire in order to rank the different domains and determinants.

Delphi study

The expert panel recruitment was performed by a literature search for key publications in the field of eHealth implementation using PubMed, Medline, and Google Scholar as the main bibliographic databases. The corresponding authors of the key publications were contacted via email and were asked to indicate the leading experts in the field of eHealth implementations. The criteria used for selecting the expert panel include 'demonstrable experience in eHealth implementation in a leading position in a renowned practice or in a research position such as a professor or PhD position'. Eventually, a total of 16 of the suggested international experts met the inclusion criteria for the expert panel. They came from various fields, including healthcare, ICT & technology, and research. These 16 experts were contacted via email, of whom 13 (four had a professor degree, four a PhD degree, and five an MSc degree) agreed to participate (81.3%) in a two-round Delphi study.

In the present study, the preconditions of a Delphi study were used to generate the needed information in a structured manner. This entailed the following steps: conduct multiple feedback rounds, facilitate a communication platform for correspondence, use a feedback mechanism, pay attention to divergent interests and problem definitions, incorporate a step-by-step judgement, and perform statistical processing of the received answers.[29] The expert panel received an email with a URL-link to an online questionnaire in which they were requested to score the 20 determinants for successful implementation of eHealth interventions on a 10-point Likert scale (1 = not relevant at all; 10 = most relevant). For all the determinants in the online questionnaire, a short explanation was provided to ensure the determinants were not likely to be misinterpreted.

Table 1. Domains, determinants, and definitions based on the empirical research.

Domain	Determinants	Definitions	References
Technology	Support	User support during the use of the eHealth program (i.e., installation and maintenance of the system, solving errors or problem situations).	Broens et al.,[12] and Van Duijvendijk and Van den Akker[14]
	Training	Training, at all levels, regarding the use of the eHealth program (i.e., managers to interpret data, doctors to monitor vital signs, nurse to manage practical parts, patient to use the eHealth program).	Boyne and Vrijhoef,[11] Broens et al.,[12] and De Vries et al.[36]
	Usability	Patients, doctors and supporting staff need to be familiar with the use and accessibility of the eHealth program.	Boyne and Vrijhoef,[11] Broens et al.,[12] Van Duijvendijk and van den Akker,[14] Wood et al.,[23] De Vries et al.,[36] and Asselbergs et al.[37]
	Quality	Quality of the internet connection and supporting infrastructure (i.e., equipment, data storage, and data backup).	Boyne and Vrijhoef,[11] Broens et al.,[12] Brewster et al.,[13] Van Duijvendijk and van den Akker,[14] Taylor et al.,[15] Wood et al.[23]
	Data Automatically	Automatic forwarding of information from the eHealth program to the Electronic Medical Record (EMR).	Boyne and Vrijhoef,[11] Asselbergs et al.[37]
	Modular Construction	Various modules can be selected based on the patients' situation, preferences, and needs.	Asselbergs et al.[37]
	View Data	Patients, nurses and/or doctors have access to the patients' information in the eHealth program and can (if necessary) add additional information.	Asselbergs et al.[37]
	Setting Bandwidths	Setting bandwidths, or lower and upper limits, of physiological parameters such as blood pressure, weight, etc. per individual patient.	Asselbergs et al.[37]
	Open System	The ability of the eHealth program to connect with devices (i.e., to assess physiological parameters) and to exchange data with primary, secondary, and tertiary care EMRs.	Boyne and Vrijhoef,[11] and Asselbergs et al.[37]
Acceptance	Attitude	The thoughts, opinions, and preferences of patients and/or healthcare providers regarding the eHealth program.	Boyne and Vrijhoef,[11] Broens et al.,[12] Brewster et al.,[13] Van Duijvendijk and van den Akker,[14] and Taylor et al.[15]
	Evidence-Based Medicine	The effectiveness of the eHealth program is shown in order to convince healthcare providers and/or policy makers.	Broens et al.[12]
	Diffusion & Distribution	The presence of key users of the eHealth program to stimulate people to be involved and use the program.	Broens et al.[12]
Financing	Financing	The costs (e.g., of the eHealth program and personnel costs) of using the eHealth program.	Boyne and Vrijhoef,[11] Broens et al.,[12] Wood et al.[23]
Organizational	Strategy	A (project) plan is made to apply the eHealth program into the current organizational processes.	Boyne and Vrijhoef[11]
	Organizational Support	Support for using the eHealth program by both supporting staff, healthcare providers, and patients.	Boyne and Vrijhoef[11]
	Available Resources	Sufficient resources to implement the eHealth program (i.e., time, personnel, hardware).	Dohmen and Eijck[16]
	Process Agreements	The presence of protocols and/or procedures to execute the eHealth program (e.g., patient information or how to cope with warnings).	Boyne and Vrijhoef[11] and Broens et al.[12]

(continued)

Table 1. Continued.

Domain	Determinants	Definitions	References
	Organizational Change	The ability of the organization to provide changes in collaboration and (team) roles, rights and responsibilities.	Boyne and Vrijhoef[11] and Broens et al.[12]
Legislation and Policy	Legislation & Policy	Complying with the current legislation and policy regarding eHealth applications.	Broens et al.[12]
	Safety	The eHealth program is safe for patients (e.g., physical safety and/or information transfer).	Boyne and Vrijhoef,[11] Broens et al.,[12] Wood et al.[23]

First round

In July 2019, the 13 international experts who agreed to participate in the Delphi study received an email invitation to complete the online questionnaire. In the questionnaire, they were asked to score all determinants, with answer options ranging from '1 = not relevant at all' to '10 = most relevant'. In this first round, the expert panel was also asked to indicate if important determinants and/or literature references were missing with regard to assessing the implementation of eHealth interventions. To monitor if all the experts had completed the online questionnaire, they were asked to enter their name in one of the questions. If a participant had not completed the questionnaire before August 2019, that participant received an email reminder. In total, 12 experts filled out the online questionnaire (response rate = 92.3%). Of the experts who completed the first round of the Delphi study, four had a professor degree, three a PhD degree, and five an MSc degree.

For the results of the first round, median and mean scores were calculated to assess the relevance of the determinants (see Table 2). To inform the expert panel of the scored relevance on the different determinants, the mean scores of the first Delphi round were added to all the items in the online questionnaire for the second round (i.e., divergent consensus). Furthermore, the important determinants that the expert panel indicated were missing in the first round were incorporated into the online questionnaire for the second round.

Second round

In October 2019, the 13 experts who originally agreed to participate in the Delphi study received an email invitation with a request to complete the online questionnaire for the second Delphi round. In this questionnaire, all the determinants of the first round were mentioned along with their mean scores and the additional determinants suggested by the expert panel. Similar to the first round, the experts scored the determinants on a 10-point Likert scale, ranging from '1 = not relevant at all' to '10 = most relevant'. If the questionnaire was not completed by November 2019, the expert received an email reminder. In total, 13 experts filled out the online questionnaire of the second round (response rate = 100%). Four of the experts who completed the online questionnaire had a professor degree, four a PhD degree, and five an MSc degree.

To assess the relevance of the individual determinants, in the second round the median and mean scores were calculated again. Subsequently, the interquartile range (IQR) score was assessed in order to calculate the agreement between the experts regarding the relevance of the determinants. Prior research[24,26,30] has found that the IQR in earlier Delphi studies was effectively able to assess the consensus between experts. In essence, the IQR is the difference between the 25th and 75th percentile. The smaller the IQR score, the higher the degree of consensus between the experts in the panel. According to prior literature,[26,31] an IQR of 2 or less combined with a mean score higher than 8 represents good consensus between experts using a 10-point Likert scale. Based on the results of the second round in the present study, determinants were indicated as relevant if the mean score was higher than 8 and the IQR was 2 or less, as this combination represents consensus between the experts.[24,30,31] Determinants that met those criteria were used in the development of the instrument to guide implementation of eHealth interventions. For the analyses in both the first and second Delphi rounds, SPSS 25.0 was used.

Results

First round

In Table 2 the results of the first round, regarding median and mean scores, are shown. Usability (mean = 9.33), Support (mean = 9.25), Training (mean = 9.17), Process Agreements (mean = 9.17), Strategy (mean = 9.08), and Organizational Change (mean = 9.08) score highest on the mean scores, indicated by the expert panel (n = 12). The lowest scoring determinant in the first round is Evidence-Based Medicine, with a

Table 2. Results of Round 1 & Round 2 of the Delphi study.

		Round 1			Round 2			
Domain	Determinants	*N*	Md	*M*	*N*	Md	*M*	IQR
Technology	Support	12	9	9.25	13	10	9.31	1
	Training	12	9	9.17	13	9	9.07	1
	Usability	12	9,5	9.33	13	10	9.69	1
	Quality	12	8,5	8.67	13	9	8.08	1
	Data Automatically	12	9	8.92	13	9	8.85	2
	Modular Construction	12	8	8.00	13	9	8.62	1
	View Data	12	9	8.75	13	9	9.00	1
	Setting of Bandwidths	12	9,5	8.83	13	9	9.00	1
	Open System	12	9	8.83	13	9	9.00	2
	Evaluation[a]	–	–	–	13	9	8.62	1
Acceptance	Attitude	12	8	8.25	13	8	8.00	1
	Evidence Based Medicine	**12**	**7**	**6.75**	**13**	**7**	**6.77**	**2**
	Diffusion & Distribution	12	9	8.42	13	9	8.77	1
	Patient Characteristics[a]	–	–	–	13	9	7.85	2
Financing	Financing	12	8,5	8.33	13	9	8.69	1
Organizational	Strategy	12	9	9.08	13	9	8.85	2
	Organizational Support	12	9	8.92	13	9	8.77	2
	Available Resources	12	8	8.42	13	9	8.62	1
	Process Agreements	12	9	9.17	13	9	8.92	1
	Organizational Change	12	9,5	9.08	13	10	9.15	1
	Multidisciplinary Team[a]	–	–	–	13	9	8.54	1
	Upscaling[a]	–	–	–	13	9	8.85	1
Legislation and Policy	Legislation & Policy	12	8	8.08	13	8	8.38	1
	Safety	12	9	9.00	13	9	9.23	1

[a]New determinants addressed in the first Delphi round and assessed by the expert panel in the second Delphi round

mean score of 6.75. Besides scoring the individual determinants, experts were also asked to suggest other important determinants. 'Evaluation' (i.e., review the effects and costs of the new eHealth program and assess potential adjustments), 'Patient Characteristics' (i.e., identifying suitable patients or patient groups to participate in the eHealth program based on predefined inclusion and exclusion criteria), 'Multidisciplinary Team' (i.e., involving multiple disciplines such as medicine, nursing sciences, psychology, ethics, computer sciences to increase the implementation success), and 'Upscaling' (i.e., the extent to which the eHealth program can be scaled up to larger and/or other patient groups) were suggested as important determinants to take into account in the second round of the Delphi study.

Second round

The results of the second round are also presented in Table 2. In all but one of the 24 determinants scored by the expert panel consensus was obtained (mean score $\geq$ 8; IQR $\leq$ 2). For the determinant Evidence-Based Medicine, no consensus was reached (mean score $<$ 8; IQR = 2). Based on the results regarding the five domains (i.e., Technology, Acceptance, Financing, Organizational, and Legislation & Policy) and 23 corresponding determinants a guideline for the implementation of eHealth interventions has been developed (Table 3). In the Supplementary file, the full eHealth implementation guideline to be used in practice is shown.

Discussion

The present study aimed to develop a guideline for the implementation of eHealth interventions, in order to increase their effectiveness, by means of a literature research and a two-round Delphi study. After the two-round Delphi study, consensus was reached on five domains and 23 corresponding determinants (mean scores $\geq$ 8; IQR $\leq$ 2). Concerning the determinant 'Evidence-Based Medicine', no consensus was reached by the experts (mean score $<$ 8; IQR = 2). Based on the 23 determinants, a guideline for successful implementation of eHealth interventions was developed.

In accordance with prior research,[12] the experts reached a consensus on the domains Technology, Acceptance, Financing, Organizational, and Legislation & Policy. However, in other studies[21,22] different terminology was used for these domains (e.g., Innovation, Individual, Organization, and Socio-Political

Table 3. Domains and determinants of the eHealth implementation guideline.

Domain	Determinant	Operationalization	Absent	Present
Technology	Support	Support is available for users both during and after implementation of the e-health intervention.		
	Training	Users are trained on the use of the e-health intervention.		
	Usability	Patients are familiar with the use of an e-health intervention. Supporting staff and/or doctors are able to operate the e-health intervention and have easy access to the system.		
	Quality	The internet connection and supporting infrastructure is of good quality.		
	Data automatically	Information can be forwarded automatically from the eHealth program to the Electronic Medical Record (EMR).		
	Modular construction	Various modules can be selected based on the patients' situation, preferences, and needs.		
	View data	Patients, nurses and/or doctors have access to the patients' information in the eHealth program, and can (if necessary) add additional information.		
	Setting bandwidths	It is possible to set bandwidths, or lower and upper limits, of physiological parameters such as blood pressure, weight, etc. per individual patient.		
	Open system	The eHealth program is able to connect with devices (i.e., to assess physiological parameters) and to exchange data with primary, secondary, and tertiary care EMRs.		
	Evaluation	Effects and costs of the new eHealth program are reviewed and potential adjustments can be assessed.		
Acceptance	Attitude	Positive thoughts, opinions, and preferences of patients and/or healthcare providers regarding the eHealth program.		
	Diffusion and distribution	The presence of key-users of the eHealth program to stimulate people to be involved and use the program.		
	Patient characteristics	Suitable patients or patient groups are identified to participate in the eHealth program based on predefined inclusion and exclusion criteria.		
Finance	Financing	Available budget (e.g., of the eHealth program and personnel costs) for using the eHealth program.		
Organizational	Strategy	A (project) plan is made to apply the eHealth program in the current organizational processes.		
	Organizational support	Support for using the eHealth program by both supporting staff, healthcare providers, and patients.		
	Available resources	Sufficient resources are available to implement the eHealth program (i.e., time, personnel, hardware).		
	Process agreements	Protocols and/or procedures are present to execute the eHealth program (e.g., patient information or how to cope with warnings).		
	Organizational change	The organization is able to provide changes in collaboration and (team) roles, rights and responsibilities.		
	Multidisciplinairy team	Multiple disciplines are involved, such as medicine, nursing sciences, psychology, ethics, and computer sciences, to increase the implementation success.		
	Upscaling	The eHealth program can be scaled up to larger and/or other patient groups.		
Legislation and Policy	Legislation and policy	Complying with the current legislation and policy regarding eHealth applications.		
	Safety	The eHealth program is safe for patients (e.g., physical safety and/or information transfer).		

Environment), and in numerous prior studies[11,21,22] the domain Financing was absent. This may be explained by the fact that the purpose of these studies was to develop an instrument to assess the implementation process afterwards rather than a framework to guide the implementation of eHealth interventions. In the present empirical research, the domains and determinants are mainly based on prior systematic reviews, which increases the likelihood that the most relevant domains and determinants were included. The experts' consensus in the Delphi study offers further support regarding the relevance of these domains and determinants. Nevertheless, additional determinants were suggested by the experts (e.g., Evaluation, Patient Characteristics, Multidisciplinary Team, and Upscaling) for guiding the implementation of eHealth interventions in order to increase their effectiveness. Besides the determinants that were derived from the literature search, the determinants were also deemed relevant based on the consensus reached by the experts in the second round.

No consensus was reached regarding the determinant Evidence-Based Medicine. Already in the first round of the Delphi study the experts indicated this determinant was the least important, giving it the lowest mean score (mean score= 6.75). In prior research,[17] it is concluded that information concerning the effectiveness of an innovation (e.g., relative advantage) is a crucial factor to convince end-users and intermediaries to implement new innovations. Although the determinant Evidence-Based Medicine is defined similarly in the current study, the experts considered it to be less relevant. Based on the quantitative results of the present research, the reason for this scoring cannot be determined; a qualitative research (i.e., face-to-face or focus group) would be necessary to assess the reason for this scoring.

Based on the results of the literature research and Delphi study, a guideline for the implementation of eHealth programs was developed (see Table 3 and for practical usage the Supplementary file**)**. To assess the presence or absence of determinants in the implementation guideline, a binary score is used which is known to be less complex and just as reliable as using a Likert scale.[32] Furthermore, it may be that hierarchy between the items in the eHealth implementation guideline is present and of influence. In this research, an IQR ≤ 2 represented consensus between the participating experts.[24,30,31] Although a higher degree of consensus is illustrated by smaller values, it does not represent a higher degree of importance between specific determinants. In a study by Broens et al.,[12] 'Acceptance' is mentioned as the most reported and assessed domain in prior research; however, it does not represent the most dominant domain in the field of eHealth. Therefore, future research should assess the presented guideline for eHealth interventions in prospective studies, in order to indicate the potential hierarchy of the presented domains and determinants.

In the present study, 20 determinants were selected by means of an extensive literature search. After the first feedback round by experts, four important determinants (i.e., Evaluation, Patient Characteristics, Multidisciplinary Team, and Upscaling) were added. However, in the second Delphi round, no consensus was reached for one determinant (i.e., Evidence-Based Medicine). This illustrates that, also for the participating experts, eHealth implementations are complex and include a variety of variables to take into account. This complexity was also stressed by Stanimirović and Vintar[33] regarding national success factors in the development of eHealth interventions (i.e., strong political commitment, support, and advocacy). Moreover, based on the inconsistent findings in prior systematic reviews[34,35] regarding eHealth implementations in practice, it is stressed that extensive research is needed for effective implementation strategies. This may imply that the presented eHealth implementation guideline is suitable for a qualitative assessment of the implementation strategy. For a quantitative assessment, the instrument needs to be validated and periodically recalibrated to increase the potential of improving eHealth implementation strategies. Although further research is needed, the developed eHealth implementation guideline contributes to the current knowledge because it provides a concrete checklist to guide eHealth interventions or applications in practice using the main determinants of effective implementation. Use of the developed guideline is expected to increase the effectiveness of implementation of eHealth interventions in practice.

Limitations

Despite the fact that the literature research and the Delphi study were executed in a structural manner, the development of the instrument to guide eHealth interventions in practice may have been subject to methodological restrictions. First, only 13 of the 16 invited international experts (81.3%) participated in the Delphi study. For that reason, the consensus which was reached between the experts in the present Delphi study may not be completely representative for all experts in the field of eHealth, since both the 'demand side' and 'supply side' of eHealth interventions needs to be highlighted. Second, one might argue that the time interval between the first (July 2019) and second round (October 2019) was too long. Within a Delphi study, experts respond to questions and statements[26,29] in successive rounds with similar follow-up periods. However, it is expected that time intervals have had a minimal impact in Delphi research. Based on the mean values

in the first and second round, as shown in Table 2, differences in mean scores between the two rounds are minimal, which indicates that the time interval had no or minimal influence on the results. A final limitation of the present study may be that the developed guideline to increase the effectiveness of eHealth interventions in practice is based on empirical research and expert consensus by means of a Delphi study. The international validity, reliability, and practical applicability of the instrument needs to be assessed in future prospective studies (i.e., RCTs or cohort research).

Conclusion

In the present study an eHealth implementation guideline is developed in order to increase the effectiveness of the selection and implementation of eHealth interventions in daily practice. Although the presented instrument has a strong methodological basis, it is recommended to assess the validity, reliability, and applicability of the eHealth implementation guideline in future prospective research.

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Supplemental Material

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