The determinants of effective eHealth: high-quality applications and optimal organization: evaluating an online patient portal form a patient perspective and evaluating the quality of hybrid care from an organizational perspective

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Chapter 5

Development of a quality management model and self-assessment questionnaire for hybrid health care: a concept mapping study

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Abstract

Background
Working with eHealth requires health care organizations to make structural changes in the way they work. Organizational structure and process must be adjusted to provide high-quality care. This study is a follow-up study of a systematic literature review on optimally organizing hybrid health care (eHealth and face to face) using the Donabedian Structure-Process-Outcome (SPO) framework to translate the findings into a modus operandi for health care organizations.

Objective
This study aimed to develop an SPO-based quality assessment model for organizing hybrid health care using an accompanying self-assessment questionnaire. Health care organizations can use this model and questionnaire to manage and improve their hybrid health care.

Methods
Concept mapping was used to enrich and validate evidence-based knowledge from a literature review using practice-based knowledge from experts. First, brainstorming was conducted. The participants listed all the factors that contributed to the effective organization of hybrid health care and the associated outcomes. Data from the brainstorming phase were combined with data from the literature study, and duplicates were removed. Next, the participants rated the factors on importance and measurability and grouped them into clusters. Finally, using multivariate statistical analysis (multidimensional scaling and hierarchical cluster analysis) and group interpretation, an SPO-based quality management model and an accompanying questionnaire were constructed.

Results
All participants (n=39) were familiar with eHealth and were health care professionals, managers, researchers, patients, or eHealth suppliers. The brainstorming and literature review resulted in a list of 314 factors. After removing the duplicates, 78 factors remained. Using multivariate statistical analyses and group interpretations, a quality management model and questionnaire incorporating 8 clusters and 33 factors were developed. The 8 clusters included the following: Vision, strategy, and organization; Quality information technology infrastructure and systems; Quality eHealth application; Providing support to health care professionals; Skills, knowledge, and attitude of health care professionals; Attentiveness to the patient; Patient outcomes; and Learning system. The SPO categories were positioned as overarching themes to emphasize the interrelations between the clusters. Finally, a proposal was made to use the self-assessment questionnaire in practice, allowing measurement of the quality of each factor.

Conclusions
The quality of hybrid care is determined by organizational, technological, process, and personal factors. The 33 most important factors were clustered in a quality management model and self-assessment questionnaire called the Hybrid Health Care Quality Assessment.

The model visualizes the interrelations between the factors. Using a questionnaire, each factor can be assessed to determine how effectively it is organized and developed over time. Health care organizations can use the Hybrid Health Care Quality Assessment to identify improvement opportunities for solid and sustainable hybrid health care.

Keywords
quality assessment; hybrid health care; blended health care; eHealth; digital health; structure; process; outcome; concept mapping

Introduction

Background

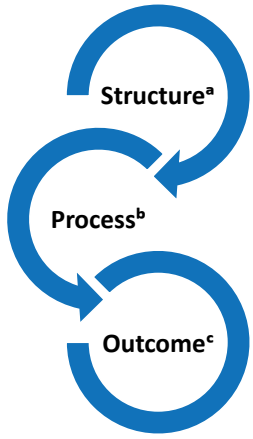
In recent years, the use of eHealth has expanded, encouraged by the increasing pressure on health care[1,2] and growing interest in patient empowerment.[3,4] On the one hand, an aging population and an increase in chronic diseases are causing a higher and more complex demand for health care. In addition, the COVID-19 pandemic has accelerated pressure on health care.[5-8] Therefore, innovations such as eHealth are required to maintain accessibility and high quality of health care.[9-12.] On the other hand, digital health technologies have significantly accelerated patients' involvement.[13-16] In line with these developments, health care organizations have intensively integrated eHealth into traditional face-to-face consultations.[17] The combination of eHealth and face-to-face consultations can be defined as hybrid health care.[18,19] A few examples of hybrid health care are telemonitoring systems for patients with chronic diseases,[20,21] web-based video coaching,[22,23] and direct web-based access to medical records of patients,[24,25] all of which are integrated into traditional health care.

Although health care organizations are increasingly providing hybrid health care, integrating eHealth into the daily care process is challenging. Working with hybrid health care requires organizations to change the way they work. The roles of health care providers and patients are changing, and the available resources are used differently.[4,22,26,27] Organizational structure and work processes must be adapted to ensure high-quality hybrid care.[28-31] Several studies have examined ways to promote eHealth adoption, such as increasing the adaptability of the technology or stakeholders' value.[32,33] However, it remains challenging to organize hybrid health care effectively and sustainably.[17] There is a need for further research on how hybrid health care can be improved to add value to patients and health care providers when they work with eHealth. Therefore, we recently performed a systematic literature review to optimally organize hybrid health care.[17]

In the systematic literature review, the Donabedian Structure-Process-Outcome (SPO) framework was used to identify indicators related to the integration of eHealth into health care organizations.[17,34-36] (Figure 1). According to Donabedian, health care quality is based on the aspects of these 3 categories and their relationships. The SPO framework and its categories are described in detail in the literature review.[17]

In the literature review, we identified 111 potential indicators under the SPO categories that impact eHealth integration. The study demonstrated that 3 principles are important for

successful integration. First, the patient's role must be centrally placed in the organization of hybrid care. Second, technology must be well attuned to the organizational structure and daily care process. Third, the deployment of human resources must be aligned with the desired results.[17]



a. The setting in which health care is provided
b. What is actually done in giving and receiving care
c. The consequence of the provided health care

Figure 1. Donabedian Structure-Process-Outcome framework.

Objectives

To translate the findings from the literature study into a modus operandi for health care organizations, we aimed to develop a model that can help health care organizations organize hybrid health care and identify improvement opportunities for a solid and sustainable integration of eHealth. To achieve this aim, the objectives of the concept mapping study included the following: (1) enrich and validate evidence-based knowledge from the literature review with practice-based knowledge from experts and (2) develop an SPO-based model for organizing hybrid health care with an accompanying self-assessment questionnaire.

Methods

Concept Mapping

Concept mapping is a highly structured methodology for organizing ideas from different stakeholders and other data sources to produce a common framework for complex topics that can be used for evaluation or planning.[37-40] The method integrates qualitative data collection with quantitative analysis to construct an interpretable pictorial view of different ideas and concepts and how these are interrelated.[41,42] Concept mapping has been used worldwide, for a diverse range of health care projects and studies to develop conceptual frameworks, as well as health and eHealth evaluations.[43-49]

In this study, the 6-step concept mapping approach of Trochim and McLinden[42] was followed[49] to develop a usable, tailored, SPO-based quality management model for hybrid

health care and an accompanying questionnaire. The six steps of concept mapping are as follows: (1) preparation, (2) idea generation, (3) sorting and rating, (4) concept mapping analysis, (5) map interpretation, and (6) utilization. Each step involves different activities leading to an output, which serves as an input for the next step. The steps and activities are explained in Figure 2 and in the paragraphs below. All the steps were supported by the GroupWisdom webtool.[41,42]

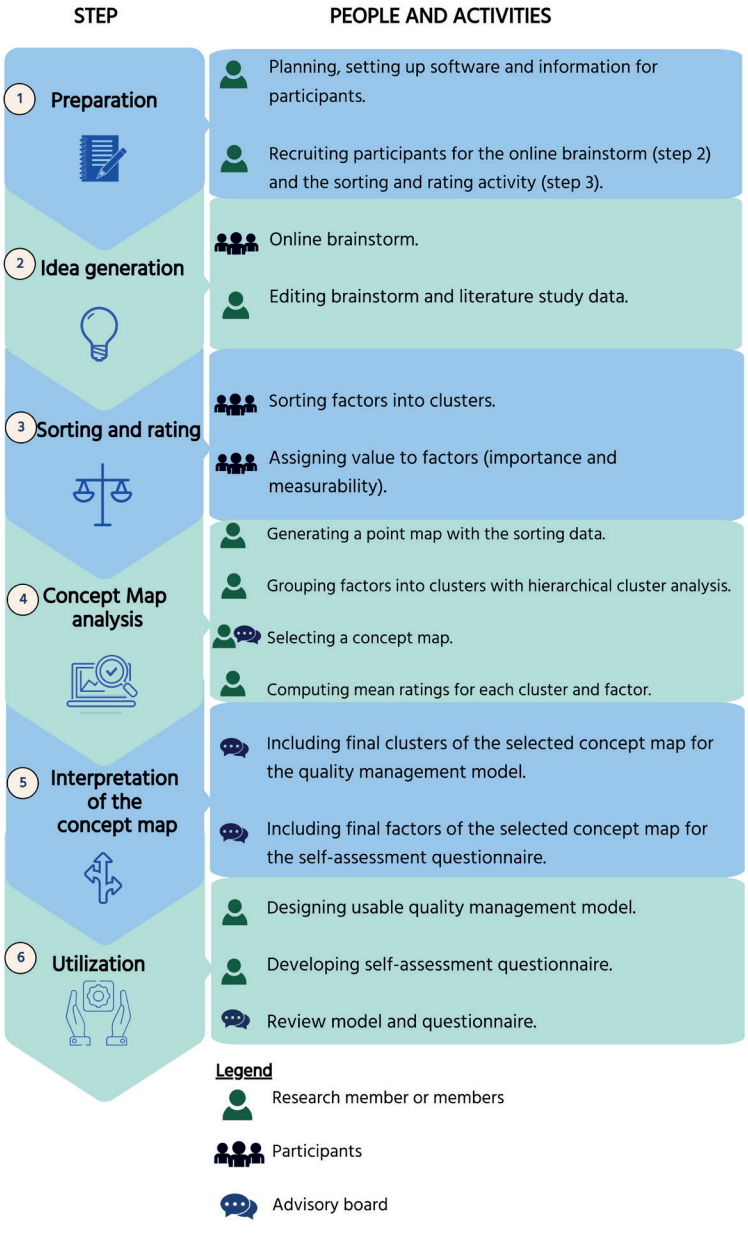


Figure 2. Concept mapping steps and study activities.

Step 1: Preparation

Concept mapping is most effective when multiple stakeholders participate in all the steps of the concept mapping process.[50] There is no strict limitation to the number of participants, ranging from small groups of 8 to 15 people or groups of hundreds of participants.[50] For this study, participants with eHealth experience, those employed by health care organizations, and patients with eHealth experience were recruited. The amount or kind of eHealth experience, health care setting, or disease was not relevant for inclusion. The goal was to create a diverse group in which different experiences, perceptions, and viewpoints complemented each other. We aimed to include a mix of health care professionals, patient experts (patients and caregivers), managers, directors, project leaders, researchers, and eHealth suppliers.

Potential participants were approached to attend both brainstorming in step 2 and sorting and rating in step 3. Participants were invited via the research team's network, social media, and snowballing. Before agreeing to participate, participants received an information letter about the concept mapping method, the study's purpose, and the SPO framework. None of the potential participants were familiar with our previous literature study results. A selected group was asked to participate in step 4 (concept mapping), step 5 (interpretation), and step 6 (utilization), which will be explained in the subsequent sections.

Step 2: Idea Generation

Web-Based Brainstorming

In step 2, data from the participants were collected and combined with data from the literature study. Idea generation with participants was organized by brainstorming. Brainstorming is the most common method used in concept mapping, and can be either group brainstorming or individual brainstorming.[42] In this study, web-based brainstorming was conducted by the participants. Participants received a link via email with instructions, giving them access to the web-based brainstorm program of the GroupWisdom webtool. Before starting the brainstorming session, informed consent was provided, and participant characteristics (age, eHealth experience, professional background, and work setting) were collected to generate general background information about the participants. When the brainstorming started session, the following instruction was presented: "Name all factors, which you believe contribute to effective organization of patient care with eHealth, and what the outcomes of this care should be. Keep the 'Structure-Process-Outcome' framework in mind."

For 23 days, the participants could list as many factors they considered essential contributors to effective hybrid health care. Participants could see each other's inputs and save their brainstorming results in the meantime. They received reminders after 10 and 15 days.

Editing Brainstorming and Literature Study Data

After closing the web-based brainstorming session, the brainstorming and literature study data were combined for sorting and rating. A manageable amount of data for sorting and rating is ideally ≤100 to prevent redundancy and a loss of participants' motivation.[51,52]

To generate a final set of up to 100 factors, duplicates and factors that did not match the brainstorming instructions were removed. For this purpose, each factor was assessed independently by the authors, RT-S and ET-K. The assessments were compared, and disagreements were resolved by discussion between RT-S and ET-K. Next, RT-S edited the remaining factors for grammar and spelling.

Authors, MK and AR reviewed the editing process to check whether they would conclude the same selection and wording and made recommendations where appropriate. Finally, the set was entered into the GroupWisdom webtool, serving as an input for the sorting and rating activities.

Step 3: Sorting and Rating

At the beginning of step 3, the participants received instructions for the sorting and rating tasks. For the sorting task, the participants were asked to cluster the factors into self-created clusters and assign names to the clusters. The participants were instructed to keep the Donabedian SPO categories in mind while sorting each factor into self-created clusters. For the rating task, each participant was asked to rate each factor by relevancy on a 5-point Likert scale, ranging from 1 (*not important at all* or *not feasible to measure*) to 5 (*very important* or *very feasible to measure*) by answering the questions, "How important is this factor for effective patient care with eHealth?" and "How feasible to measure is this factor?"

The participants had the opportunity to sort and rate over 3 weeks. They could save their activities and return later and received reminders after 10 and 15 days. The sorting data were approved for concept mapping analysis for participants who completed 75% of the sorting activity and created at least three clusters.[41] The rating data were included when the participant rated at least one factor.

Step 4: Concept Mapping Analysis

Concept mapping analysis consisted of four main activities: (1) generating a point map with the sorting data, (2) grouping factors into clusters using hierarchical cluster analysis, (3) selecting a concept map from the hierarchical cluster analysis, and (4) computing average ratings for each factor and cluster of the selected concept map.[50] All computations were based on the concept mapping approach of Kane et al[53,5] and conducted using the GroupWisdom webtool.

Generating a Point Map With the Sorting Data

Data from the rating step were analyzed to create a point map.[45,53,55,56] A point map is a 2-dimensional point map, in which each point represents a factor.[53] The point map visually displayed the locations of all factors. Factors closer to each other on the point map were sorted together more frequently by the participants, whereas more distant factors on the map were sorted together less frequently.[42,50,53] The point map was constructed using a similarity matrix and multidimensional scaling algorithm. First, the similarity matrix indicated the number of times various factors were grouped together. Next, a multidimensional scaling algorithm plotted factors as points on a point map.[42,54,55] Subsequently, a stress value (0-1) was calculated, indicating the degree to which the

distances on the point map fit the original similarity matrix.[38,54] The better the fit, the lower is the stress value.

Grouping Factors Into Clusters With Hierarchical Cluster Analysis

The point map provided the input for the hierarchical cluster analysis. The hierarchical cluster analysis grouped factors into clusters[44] using Ward algorithm.[57] The algorithm proposed several concept map solutions, where 2 clusters were merged at each following the proposed solution.

Selecting a Concept Map

From the proposed concept map solutions, a concept map that made sense for conceptualization was selected. There is no single correct number of clusters or mathematical decision criterion for selecting a concept map solution.[38,56] This study selected the number of clusters for the concept map by determining the range of the highest and lowest number of clusters. The range was the average number of clusters made by the participant and its SD.

Subsequently, the cluster solutions in this range were reviewed to select the cluster level by following the cluster tree in the Methods section of the studies by Trochim[53] and Kane et al.[54] Finally, in a meeting, 2 authors (RT-S and ET-K) and 2 participants reviewed the merging of clusters, beginning with the highest number of clusters and moving to the lowest. The 2 study participants were asked to join this meeting because of their extensive experience with eHealth, daily care processes, research, operational management, and concept mapping.

After establishing the number of clusters in the concept map, each factor was reviewed for compatibility with the cluster and to determine whether it was appropriate to move the factor to a different cluster. A cluster and its content were appropriate for inclusion when they were considered essential and usable for the quality management model.[53]

In addition, each cluster received a name and description based on the cluster names that emerged from the sorting activity.

Computing Mean Ratings for Each Cluster and Factor of the Selected Concept Map

After the cluster map was selected, the relationships between ratings were computed using pattern-match and Go-zones.[42]

Pattern-match and its Pearson product-moment (*r* value) were calculated to compare how the clusters of the selected concept map were rated on importance and measurability. The pattern-match visualized the mean ratings of each cluster in a ladder graph, connecting lines between the mean ratings on importance and measurable of each cluster.[50,57] The *r* value represented the correlation strength between the 2 mean ratings of all clusters.[50,57]

Finally, multiple Go-zones were computed: a Go-zone of the total point map and Go-zones per cluster of the selected concept map. Go-zone is a 4-quadrant graph with an

x-y graph,[50] visualizing the mean ranking results of each factor on the questions "How important is this factor" and "How feasible to measure is this factor." The minimum and maximum values for each axis were the minimum and maximum average Likert scores, respectively. The upper-right quadrant is called the *Go-zone* because it shows factors rated above the mean for both importance and measurability.[42,58] The pattern-match and Go-zone showed how important and measurable each cluster and its factors were rated for quality assessment by the individual participants during the step, sorting and rating.

The selected concept map, with its calculation of importance and measurability for each cluster and factor, formed the basis of interpretation in the next step.[53]

Step 5: Interpretation of the Concept Map

The selected concept map, with its pattern-match and Go-zones, was discussed with an advisory board. On the basis of the pattern-match and Go-zones, the advisory board decided which clusters and factors should be included in the quality management model and the accompanying questionnaire. The advisory board consisted of 4 study participants from the brainstorming and sorting step, of whom, 2 also participated in step 4, concept mapping analysis. The advisors were chosen because they could be future model users. In addition, all had extensive experience with eHealth, health care business, and as health care professionals (general practitioners, nurses, anesthetists, and clinical psychologists) in different health care settings.

The advisors voted individually on which clusters and factors of the selected concept map should be included in the quality management model and questionnaire to ensure usability. Using a web-based survey, the following questions were asked: "Which cluster should be included in the quality management model based on the mean cluster rating scores of the pattern matches? Please, specify your choice." and "On which factors should the questionnaire give focus? Guide your choice by the Go-zones of each cluster and the Go-zone of the total point map. Please specify your choice." The advisors could not see each other's votes. By 75% (3/4) agreement or more, the concerned clusters and factors were operationalized in the quality assessment model and questionnaire. Where there was less agreement, the advisors viewed all responses, including the comments, and were asked to vote again. This process was repeated until a 75% consensus was reached. The web-based survey results were used as inputs to develop the quality management model and its questionnaire.

Step 6: Utilization

Quality Management Model

The remaining clusters and their positions in the selected concept map provided the blueprint for the quality management model. First, the excluded clusters and factors were removed from the concept map. Second, the concept map with the remaining clusters was used to produce a logic model. A logic model is a framework that visualizes the interrelations between the clusters in graphic form and is therefore valuable for quality evaluation.[59] The SPO framework[34,35] was used to identify logical interrelationships between the clusters. Accordingly, noticeable SPO connections between the clusters were drawn on the map by RT-S. A simplified version of the logic model was designed

for clarity and readability. Authors SW, ET-K, and RT-S discussed the design of the quality management model to ensure the usability and clarity of the model.

Self-assessment Questionnaire
The questionnaire was drafted by RT-S with the remaining factors, taking the advisors' comments into account. The questionnaire should give care organizations insight into the quality of hybrid care and how quality develops over time. On the one hand, the questionnaire must be easy to use and uniformly independent of the type of health care organization, type of eHealth, and disease. On the other hand, the questionnaire results must provide specific guidance to improve the quality of specific clusters and factors.

The concept model and questionnaire were submitted to the advisors for peer review of usability and clarity. Their comments were processed by RT-S, resulting in an improved draft. Finally, ET-K and SW peer reviewed the last draft to ensure that the representatives' comments were implemented entirely in the quality management model and the related questionnaire.

Ethics Approval
Approval by an ethics committee was not needed because no intervention or trial has occurred in the sense that the research participants were subjected to actions or had modes of behavior imposed on them.[60]

Results

Participant Characteristics (Step 1)
A total of 39 people participated in this study. The participants had a mean age of 45.2 (SD 11.1) years and were mainly working at the family medicine clinic (12/39, 31%) or hospital (10/39, 26%) within a management function (16/39, 41%) or as a health care professional (14/39, 36%). A total of 59% (23/39) of the participants estimated their eHealth experience to be extensive. The 3 most commonly used eHealth tools were apps (37/147, 25.2% participants), web portals (35/147, 23.8% participants), and video communication (34/147, 23.1% participants). An overview of the participants' characteristics is shown in Table 1.

Of the 39 participants, 38 (97%) completed the brainstorming sessions. In all, 18% (7/38) of the participants dropped out after the brainstorming session, and a new participant joined the sorting and rating phase. In total, 79% (31/39) of the participants completed the sorting and rating phase (Figure 3).

Table 1. Participant characteristics (N=39).

Variables	Values
Age (years), mean (SD)	45.2 (11.1)
Main work setting, n (%)	
Family medicine	12 (31)
Hospital	10 (26)
Mental health clinic	5 (13)
Nursing and residential care	5 (13)
eHealth supplier	4 (10)
Research institute	2 (5)
Patient experts (self-employed)	1 (3)
Main profession, n (%)[a]	
Manager, director, or project leader	16 (41)
Health care professional (e.g., physician, nurse, therapist, or psychologist)	14 (36)
Patient expert (e.g., patient or caregiver)	5 (13)
Researcher	3 (8)
Unknown	1 (3)
eHealth technology experience, n (%)[b]	
Apps	37 (25.2)
Web portals (e.g., electronic health records or personal care records)	35 (23.8)
Video communication	34 (23.1)
Sensors and wearables	23 (15.6)
Artificial intelligence	13 (8.8)
Domotica and robotica	10 (6.8)
Estimated level of experience with eHealth, n (%)	
Extensive experience	23 (59)
Moderated experience	15 (38)
Limited experience	1 (3)

[a]Many participants had dual roles, from which they were asked to choose one role.
[b]Participants could select multiple answers.

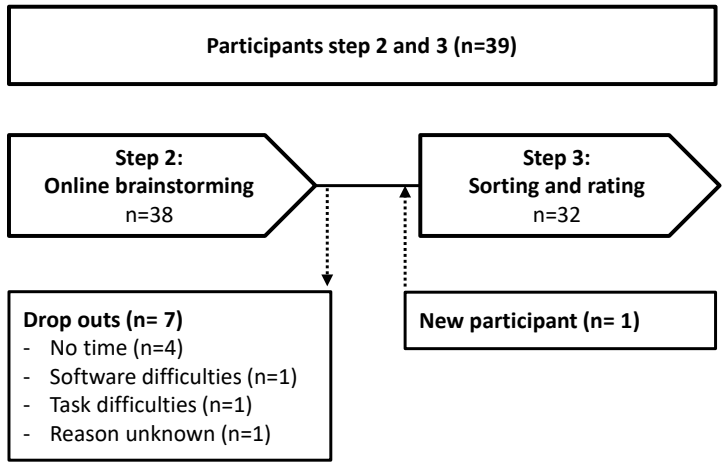


Figure 3. Number of participants at steps 2 and 3.

Idea Generation (Step 2)

Brainstorming during idea generation resulted in a list of 203 factors. A total of 111 potential indicators were extracted from the literature study.[17] Both lists were aggregated, resulting in a list of 314 factors. Editing of the data led to a final list of 78 factors. These 78 factors served as inputs for the sorting and rating activity. The list of 78 factors is provided in Appendix 1.

Sorting and Rating (Step 3)

The rating data of the 32 participants were included in this study. All factors received mean rating scores of >3.1, for both importance and measurability. The mean ratings on the questions, "How important is this factor for successful integration of eHealth?" and "How feasible to measure is this factor" are described in Appendix 1.

The sorting data of 8 people were excluded, with the reason "less than 75% sorted" (n=4, 50%) or "sorted in two clusters" (n=4, 50%). The mean number of clusters of the approved data was 7 (SD 3.5) with a range of 3 to 15 clusters.

Concept Mapping Analysis (Step 4)

Visual Representation

The point map in Figure 4 shows how the 78 factors are related according to the sorting data. The point map had a stress value of 0.26, indicating that it had a good fit with the original similarity matrix.[38,54]

The point map displays the locations of all factors that were frequently sorted closer together by the participants, whereas unrelated factors were plotted farther from each other. The number of points corresponds to the number of factors presented in Appendix 1.

Figure 4. Point map.

Selecting the Concept Map

Concept map solutions ranging from 11-cluster to 3-cluster options were reviewed (mean 7, SD 3.5). The 9-cluster concept map was selected to make the most sense of conceptualization. A few factors (n=14) were unanimously replaced, leading to the concept map shown in Figure 5. Replaced factors and their reasons are presented in Appendix 2. The 9 clusters were labelled and received a short description, as described in Table 2. The number of points corresponds to the number of factors presented in Appendix 1. The clusters represent how the participants sorted the factors into self-created clusters using the proposed cluster labels.

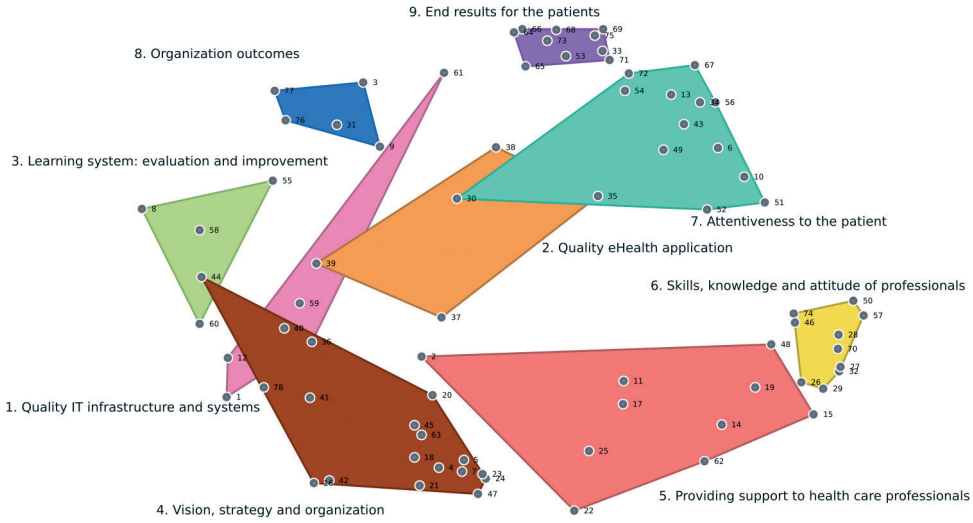


Figure 5. Nine-cluster concept map. IT: information technology.

Table 2. Clusters labels and descriptions.

Cluster number[a]	Cluster label	Description	Included factors, n
1	Quality information technology infrastructure and systems	Conditions concerning technology, information technology systems, and data.	6
2	Quality eHealth application	Conditions concerning the eHealth application.	4
3	Learning system: evaluation and improvement	Evaluation and realignment with stakeholders and the patient care objectives for a continuous development.	4
4	Vision, strategy, and organization	Responsibilities of the health care organization concerning vision, strategy, policy, leadership, funding, and work process designs.	16
5	Providing support to health care professionals	Conditions arranged by the health care organization to encourage the use of eHealth among its health care professionals.	10
6	Skills, knowledge, and attitude of health care professionals	Health care professionals' ability to provide hybrid care.	10
7	Attentiveness to the patient	Organize the daily care process in line with the patient's needs, demand for care, and its capacity.	13
8	Organization outcomes	Outcomes for the health care organization; for example, quality health care provision and health care logistics.	5
9	End results for the patient	Outcomes for the patients; for example, health, added value, satisfaction, ownership, and convenience.	10

[a]Number corresponds with the number of the concerning cluster in Figure 5.

Mean Ratings for Each Cluster and Factor of the Selected Concept Map

The pattern-match showed that all clusters had a mean score between 3.75 and 4.27 on the importance and a mean score between 3.79 and 4.10 on measurability (Figure 6). The cluster with the highest mean score on importance was Attentiveness to the patient (mean 4.27, SD 0.27), and the cluster with the highest mean score on measurability was End results for the patients (mean 4.10, SD 0.17). On the contrary, the cluster with the lowest mean score on importance was Organization outcomes (mean 3.75, SD 0.36), whereas the cluster Quality eHealth application (mean 3.79, SD 0.45) had the lowest mean score on measurability. The r value was 0.63, indicating a predictable alignment between the rating of importance and the rating of measurability. The mean ratings of the factors and Go-zones per cluster are included in Appendix 3.

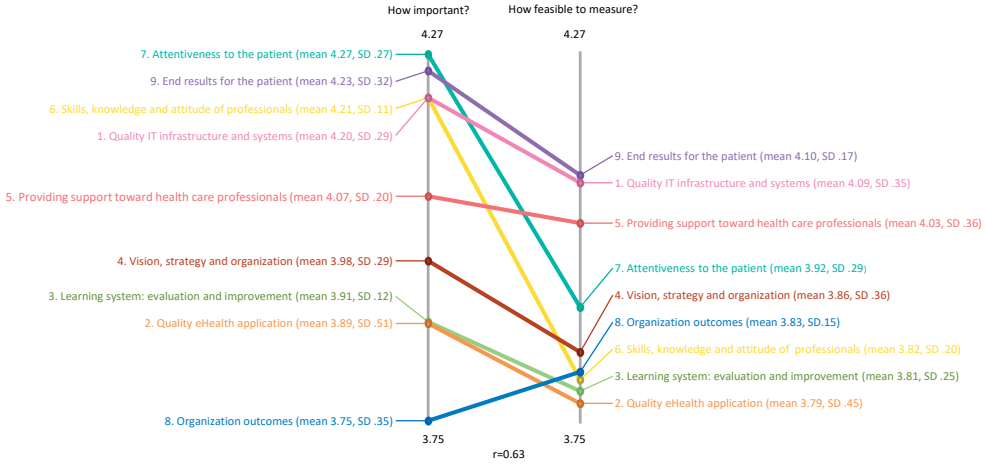


Figure 6. Pattern-match between the cluster-mean scoring on importance and measurability, with Pearson product-moment. IT: information technology.

Interpretation of the Concept Map (Step 5)

The pattern-match and Go-zones were input to determine which clusters and factors of the selected concept map should be included in the quality management model and questionnaire. Decisions were made in 2 voting rounds. Of the 9 clusters, the cluster *Organization outcomes* was not included in the quality management model, based on the voting (3/4, 75% of the advisors had doubts about including the cluster in the model) and after discussion with the research team. The factors included in the questionnaire concerned those placed in the Go-zone of the total point map or the Go-zone of the clusters. As a result, 8 clusters remained in the model and 33 factors in the questionnaire remained as a manageable utility for quality assessment (Textbox 1). Appendix 3 presents the responses and comments of the advisory board during the voting rounds.

Textbox 1. The included clusters and factors.

Quality Information technology infrastructure and systems (1)
- Information technology architecture available within the health care organization (1).
- Back-up scenario during technical problems (12).

Quality eHealth application (2)
- The eHealth application is user-friendly (35).

Learning system: evaluation and improvement (3)
- Cocreation: eHealth is developed, implemented and redeveloped with different stakeholders (8).
- Monitoring and evaluation of service and treatment results (58).

Vision, strategy, and organization (4)
- Support the implementation and development of eHealth in the organization with good project management (4).
- Mobilizing funding for working with eHealth (16).
- Clear internal policies regarding the use of eHealth (18).
- Vision supported by the line, "Why are we doing this?" (21).
- Care delivery with eHealth complies with laws and regulations (41).
- Financial reimbursements for eHealth deployment (42).
- Redesign the current work process and review what contributes to the desired care outcomes (47).

Providing support toward health care professionals (5)
- Health care professionals have easy access to information technology resources; for example, device, internet, screen, or headset (2).
- Embedding eHealth in the daily practice of health care professionals (11).
- Training and supervision for health care professionals (15).
- Help desk for health care professionals (17).
- Information on the treatment with eHealth is clear and accessible to the health care professional (19).

Skills, knowledge, and attitude of health care professionals (6)
- Good balance between face to face and eHealth for the health care professional (46).
- The health care professional has confidence in the eHealth application (70).
- The health care professional is satisfied with working with eHealth (74).

Attentiveness to the patient (7)
- Clear communication to the patient about how care is offered (10).
- Personalized care, considering patient needs with regard to (deployment of) eHealth (13).
- The patient has easy access to the necessary information technology resources; for example, device, Internet, and so on (30).

- Patients receive practical support in using the eHealth application; for example, a help desk (49).
- The patient has confidence in the eHealth application (67).
- The patient has the flexibility to use eHealth wherever and whenever it is convenient (72).

End results for the patient (9)
- The patient can integrate the use of eHealth in their daily life (33).
- Treatment with eHealth has a positive influence on the patient's health (64).
- Treatment with eHealth contributes to the patient's self-reliance (65).
- The patient is satisfied (68).
- The patient has easy access to care (71).
- eHealth provides logistical convenience for the patient (73).
- eHealth has added value for the patient (75).

Utilization (Step 6)

Utilization Model

The clusters and factors excluded from the voting rounds were removed from the selected concept map. The remaining clusters (n=8) and their factors (n=33) led to nonoverlaying clusters on the concept map. Above the clusters, the SPO categories were positioned as overarching themes to emphasize the interrelations between the clusters. In addition, a complex cluster map can be simplified into a logic model. Figures 7A-C show the simplification of the model.

The overarching categories *structure*, *process* and *outcomes* and the clusters' interconnections refer to the Donabedian SPO framework.[34,35] The cluster *Learning system* is visualized in the arrows with the dashed line. The numbers inside the clusters represent the number of factors included.

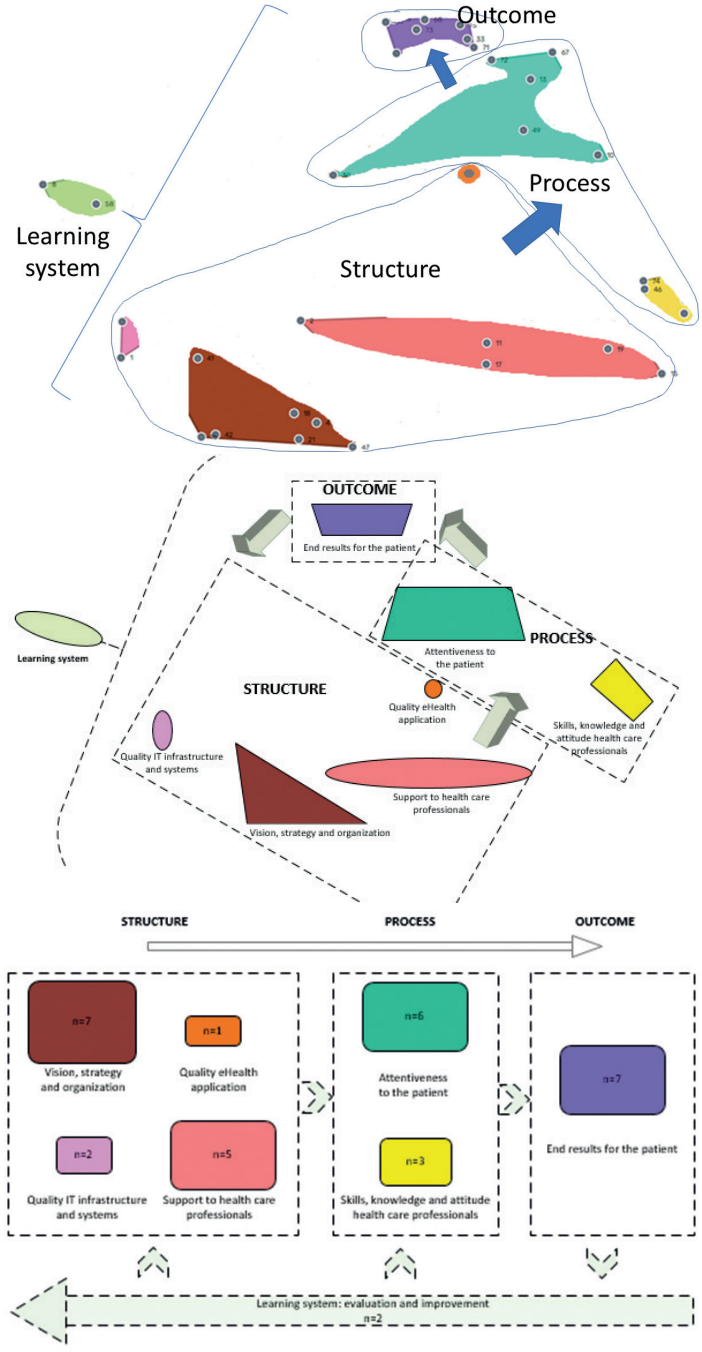


Figure 7. Simplification of the model. (A) Removing the excluded cluster and factors from the selected concept map and adding the overarching categories structure, process, and outcome. (B) Drawing a logic interrelationship with structure, process, and outcome categories. (C) Simplification into a quality management model. IT: information technology.

Utilization Questionnaire

The remaining 33 factors were included in the questionnaire, where each factor can be measured on how effectively it is organized and developed over time. The advisory board noted that measuring the quality progress of hybrid health care is very important, in addition to learning and continuous improvement with stakeholders. Subsequently, the idea was to enrich the questionnaire with a quality progress tracker based on the plan-do-check-act (PDCA) cycle of Deming.[61] Incorporating the PDCA cycle makes it possible to assess the quality easily and uniformly with tailored feedback for health care organizations. PDCA is a well-known cycle method for continuous improvement and quality measurement.[61] The PDCA cycle assess each factor's quality by measuring the extent to which *The objective is tangible?* (plan), *The plan is implemented?* (do), *To what extent is the plan realized?* (check), and *Providing feedback on the quality of the execution to make improvements* (act).[61] Each factor can be monitored on the quality level of the PDCA cycle using a Likert score (0-10). A score of 0 means there is *no plan to improve the concerning factor*, and a score of 10 means *continue improvement with stakeholders*. The Likert scoring is based on the PDCA cycle and the 2 factors of the cluster Learning system, which include the following: (1) *Cocreation: eHealth is being developed and implemented with various stakeholders* and (2) *Monitoring and evaluation of service- and treatment outcomes*. Using the PDCA cycle in combination with a Likert score provides a health care organization insight into improvement possibilities for each factor or cluster.

Finally, the model and questionnaire obtained a more convenient workname Hybrid Health Care Quality Assessment (HHQA). The HHQA model and questionnaire with suggestions on how to use it are explained in Appendix 4.

Discussion

Principal Findings

In this concept mapping study, we aimed to develop an SPO-based model and an accompanying self-assessment questionnaire for hybrid health care. By combining practice-based knowledge from eHealth users with an evidence-based literature review, we found that organizational, technological, and process and personal factors affect the quality of hybrid health care. Health care organizations must understand that these factors play a role in organizing hybrid health care and should be familiar with ways to improve them. The authors developed the HHQA, which can be used to systematically assess and improve the quality of hybrid health care.

The HHQA model includes 8 clusters. Cluster 1 (*Vision, strategy, and organization*) includes the responsibilities of the management to set the vision, strategy, policy, leadership, finance, and project management. Cluster 2 (*Quality information technology infrastructure and systems*) focuses on information technology infrastructure and back-up scenarios by information technology issues. Cluster 3 (*Quality eHealth application*) concerns the user-friendliness of the digital health application itself. Cluster 4 (*Providing support toward care professional*) and cluster 5 (*Skills, knowledge, and attitude of health care professionals*) include factors concerning health care providers. Cluster 4 focuses on factors that should

be arranged for the individual health care professional by the care organization, and cluster 5 includes the responsibilities of the professional. The patient is central in cluster 6 (*Attentiveness to the patient*). This cluster contains the measurement of factors that allow patients to increase their self-management and consider the individual patient's needs. Patient centeredness is also reflected in cluster 7 (*Patient outcomes*), including factors such as patient's health outcomes, added value, satisfaction, ownership, and convenience. Finally, cluster 8 (*Learning system*), forms the relationship between the continued development of hybrid health care with stakeholders and health care provision objectives. The factors in cluster 8 provide insight into where alignment can be improved with other organizational criteria and actions, such as cost-benefit or capacity management.

The interdependencies of the clusters are logically expressed in the HHQA model because of the overarching categories of the Donabedian SPO framework. Moreover, according to eHealth users, clusters consist of the most important factors for the quality of hybrid health care. Using the questionnaire, each factor (33 in total) can be measured to determine how effectively it is organized and develops over time. Subsequently, the main results of the questionnaire will be shown at the cluster level. It is possible to zoom in on the relevant factors for each cluster.

Comparison With Literature

In our previous literature review,[17] we concluded that the capabilities of patients, health care professionals, and technology play a crucial role in the quality of hybrid health care. We also concluded that offering hybrid health care requires adjusting the daily care process and appropriate process monitoring. The conclusions from the literature review are reflected in the HHQA clusters, namely, the patient's role is visible in the clusters *Attentiveness to the patient* and *Patient outcomes*; the health care professional's role is central in the clusters *Providing support toward health care professionals* and *Skills, knowledge, and attitude of professionals*; and technology is covered in the clusters *Quality information technology infrastructure and systems* and *Quality eHealth application*. The adjustment of the daily care processes is elaborated in the cluster *Vision, strategy, and organization*. Finally, monitoring is embedded in the cluster *Learning system* and the PDCA-progress tracker.

The 8 clusters of the HHQA model fit the 3 overarching categories of the Donabedian SPO framework. According to Donabedian,[34] health care quality is based on aspects of these 3 categories and their relationships. The interaction between the categories can be bidirectional and is an "unbroken chain of antecedents, followed by intermediate ends, which are themselves the means to still further ends".[35] Our research translated the complex interaction between the categories, structure, process, and outcome into user language.

The HHQA connects essential contributions to the quality of hybrid health care using a progress tracker. The relationship between quality contributors and continuous improvement also appears in the European Foundation for Quality Management Model (EFQM);[62,63] nonadoption, abandonment, scale-up, spread, sustainability (NASSS);[32] and the Consolidated Framework for Implementation Research (CFIR).[64,65] All models approach

the organizational structure, process, and outcomes with continuous improvement in a structured manner, but with different focus areas. For example, the EFQM is not specified for health care, in contrast to the NASSS and CFIR. The NASSS focuses on the adoption of technology and reduces implementation complexity, whereas the CFIR emphasizes on implementation in general. However, none of them have been specified for quality assessment and improvement of hybrid health care.

Nevertheless, it is interesting to conduct a detailed examination of the assessment questionnaires of the EFQM and NASSS. The EFQM deployed the Results-Approach-Deployed-Assessment-Refinement (RADAR) method,[66,67] a questionnaire to assess the quality improvement at each EFQM criteria, which incorporates the continued improvement circle. The assessment using the RADAR method is similar to the PDCA cycle in our questionnaire, as both monitor continuous quality improvement by completing the cycle plan-executing-monitoring and refining. However, the RADAR, similar to the EFQM model, is not specified for hybrid health care. In addition, the NASSS comes with a questionnaire to monitor the complexity of technology implementation in health care,[68] but the focus is on project management instead of the hybrid health care process itself. Furthermore, there are other questionnaires measuring the quality of eHealth[69-72] or the quality of health care.[73,74] However, these questionnaires are concerned with the quality assessment of eHealth nationwide,[68,70] the quality of a specific digital health application,[70,72] or measuring the quality of a specific disease pathway.[73,74] To the best of our knowledge, HHQA is the first questionnaire measuring the quality of hybrid health care at an organizational level, taking the role of the patient, health care professionals, and technology into account, accompanied by an improvement progress tracker. Therefore, the authors recommend using the HHQA to measure and improve the quality of hybrid health care.

Strengths and Limitations

This study has several strengths. First, the HHQA was developed in cocreation with stakeholders who are direct users of eHealth. Therefore, the HHQA content was drawn from inside the health care system itself and not conceived or imposed outside the health care organizations. Second, stakeholders choose the included clusters and factors. The researcher only played a facilitating role. Consequently, the clusters and factors accurately reflect stakeholders' views and values, expressed in their own words and visual representations. Third, the stakeholder group was diverse and consisted of representatives of health care professionals, patients, managers, researchers, and eHealth designers. Nevertheless, the stress value of the point map shows that the stakeholders' outcomes are highly compatible. Therefore, the study results are likely to be generalizable to everyday practices. Fourth, the model and questionnaire were developed by combining scientific and practice-based knowledge. Together, these strengths result in important factors for effective hybrid health care covering different users' needs and organization requirements.

Our study had some limitations. First, the questionnaire had not yet been tested in health care organizations. This will be conducted in a follow-up study. Although eHealth users from different health care organizations have reviewed the model and questionnaire, the model and questionnaire may still be too abstract for daily practice,

as is often the case in scientific research.[75-77] A follow-up study could provide concrete recommendations on how to use the HHQA. Second, it is conceivable that other factors and clusters could be included in other participants and health care environments. We attempted to overcome this problem by creating diverse groups of participants with different backgrounds, various eHealth experiences, and different kinds of health care settings. In addition, combining idea generation through brainstorming with results from a systematic literature review reduces the risk of bias. Third, based on the analysis of the concept mapping phase, 14 factors were moved to other clusters. However, some of these factors were moved far across the map, which was not entirely in line with the spirit of group concept mapping. Nevertheless, we deemed it necessary to move these factors for substantive reasons. Fourth, the advisory group consisted of 4 participants. We wanted to avoid overquestioning the participants and, therefore, deliberately selected a group of delegates who reflected on the diversity among the participants and who also had experience with quality management and concept mapping. Combined with in-depth preparation and discussion among the research groups, this appeared to be the most feasible solution.

Finally, it is worth pointing out that the HHQA gives a first general impression of improvement, as there is much to be gained in taking the role of the patient, health care professionals, and used technology into account.[17] Furthermore, the authors will continue with follow-up research and warm-heartedly welcome repetition of the study to improve the HHQA, taking into account the different users and health care environments.

Conclusions

This study developed a quality management model and an accompanying self-assessment questionnaire tailored for hybrid health care, the HHQA. A quality model for hybrid care is indispensable for effectively integrating eHealth into regular care and delivering high-quality health care. The HHQA covers all relevant aspects for the assessment and sustainable improvement of hybrid health care and the interrelations of eHealth with organizational, technical, and human factors. The next step is to validate and apply the HHQA model and questionnaire in practice.

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Conflicts of Interest
None declared.

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Abbreviations

CFIR: Consolidated Framework for Implementation Research
EFQM: European Foundation for Quality Management Model
HHQA: Hybrid Health Care Quality Assessment
NASSS: nonadoption, abandonment, scale-up, spread, sustainability
PDCA: plan-do-check-act
RADAR: Results-Approach-Deployed-Assessment-Refinement
SPO: Structure-Process-Outcome

Appendix 1: Mean (SD) rating of each cluster and factor

Table 1. Mean (SD)[a] rating of the clusters and factors

Cluster	Nr	Factor	How important?[b] Mean (SD)	How feasible to measure?[c] Mean (SD)
1. Quality information technology infrastructure and systems			4.20(0.29)	4.09 (0.35)
	12	Back -up scenario during technical problems.	4.21 (0.59)	4.17 (0.99)
	1	IT architecture available within the health care organization.	4.13 (0.73)	4.36 (0.93)
	36	Technology is up-to date and works flawlessly.	4.56 (0.57)	3.88 (0.97)
	59	Use of reliable data.	4.42 (0.64)	3.74 (0.99)
	40	Exchange of data possible between different systems; for example, EPD, HIS, HIC.	4.25 (0.88)	3.73 (1.14)
	61	Built-in patient notifications.	3.64 (0.64)	4.67 (0.75)
2. Quality eHealth application			3.89 (0.51)	3.79 (0.2)
	35	The eHealth application is user-friendly.	4.75 (0.43)	4.38 (0.70)
	39	The eHealth application is suitable as a medical intervention.	3.39 (1.15)	3.96 (0.89)
	37	The provision of care with eHealth is evidence-based.	3.73 (0.86)	3.71 (1.10)
	38	The eHealth application is also usable when the care needs are different than expected.	3.68 (0.87)	3.13 (1.05)
3. Learning system: evaluation and continue improvement of hybrid care			3.91 (0.12)	3.81 (0.25)
	8	Co-creation: eHealth is developed, implemented and redeveloped with different stakeholders.	4.09 (0.72)	3.91 (1.00)
	58	Monitoring and evaluation of service and treatment results.	3.91 (0.67)	4.17 (0.75)
	60	Learn from each other through 'best and worst practices' or other forms of exchanging experiences.	3.75 (0.80)	3.58 (1.22)
	55	Use data to tailor the treatment to the patient's situation.	3.88 (0.84)	3.58 (1.04)
4. Vision, strategy, and organization			3.98 (0.29)	3.86 (0.36)
	41	Care delivery with eHealth complies with laws and regulations.	4.33 (0.69)	4.67 (0.47)
	16	Mobilizing funding for working with eHealth.	4.33 (0.90)	3.96 (1.16)
	21	Vision supported by the line, "Why are we doing this?"	4.33 (0.62)	3.86 (0.87)
	4	Support the implementation and development of eHealth in the organization with good project management.	4.29 (0.84)	4.00 (1.00)
	47	Redesign the current work process and review what contributes to the desired care outcomes.	4.23 (0.52)	4.00 (0.80)
	18	Clear internal policies regarding the use of eHealth.	4.17 (0.80)	3.96 (1.00)
	42	Financial reimbursements for eHealth deployment.	4.09 (0.85)	3.95 (1.07)
	23	Leadership: share the vision, mission and strategy to create support.	4.08 (0.93)	3.79 (1.00)
	7	Set eHealth goals in your organization.	3.96 (0.72)	4.42 (0.70)
	5	Achievement of organizational goals concerning eHealth is invested in the organization.	3.95 (0.93)	3.96 (0.86)
	78	The costs of treatment with eHealth are transparent.	3.46 (0.87)	4.00 (0.88)
	24	Create urgency and direction within the organization: make eHealth part of every innovation and health care project.	3.96 (0.86)	3.57 (1.10)
	20	eHealth has added value for the strategy of the organization.	3.78 (0.93)	3.71 (1.14)

Cluster	Nr	Factor	How important?[b] Mean (SD)	How feasible to measure?[c] Mean (SD)
	63	Organize the work process in such a way that it becomes almost impossible to make mistakes.	3.73 (0.91)	3.22 (1.06)
	45	There is good collaboration with external partners.	3.54 (0.76)	3.26 (0.94)
	44	Treatment with eHealth is in line with community and regional needs and developments.	3.52 (0.76)	3.46 (1.15)
5. Providing support to health care professionals			4.07 (0.19)	4.03 (0.36)
	15	Training and supervision for health care professionals.	4.25 (0.60)	4.46 (0.82)
	2	Health care professionals have easy access to IT resources; for example, device, internet, screen, headset.	4.25 (0.59)	4.17 (0.85)
	17	Helpdesk for health care professionals.	4.24 (0.64)	4.71 (0.54)
	19	Information on the treatment with eHealth is clear and accessible to the health care professional.	4.13 (0.60)	4.09 (0.65)
	11	Embedding eHealth in the daily practice of health care professionals.	4.29 (0.73)	4.00 (0.87)
	14	Staff are given time to (learn to) work with eHealth.	4.17 (0.69)	3.91 (0.79)
	62	Clear guidelines and protocols for health care professionals.	3.88 (0.59)	4.20 (0.80)
	48	Make the work easier for the health care professional.	3.92 (0.86)	3.74 (0.94)
	25	Strong collaboration concerning eHealth with your colleagues of different departments within your health care organization.	3.91 (0.72)	3.50 (0.78)
	22	Encourage and support the use of eHealth by 'ambassadors' in the teams.	3.70 (0.86)	3.54 (1.29)
6. Skills, knowledge, and attitude of professionals			4.21 (0.11)	3.82 (0.20)
	70	The health care professional has confidence in the eHealth application.	4.40 (0.63)	4.13 (0.80)
	46	Good balance between face-to-face and eHealth for the health care professional.	4.29 (0.68)	4.13 (1.01)
	74	The health care professional is satisfied with working with eHealth.	4.12 (0.65)	4.04 (0.81)
	29	The health care professional is willing to learn to work with eHealth.	4.32 (0.67)	3.72 (1.04)
	28	The health care professional recognizes the added value of eHealth.	4.33 (0.62)	3.68 (0.93)
	27	The health care professional feels comfortable working with eHealth.	4.17 (0.83)	3.83 (0.85)
	50	Health care professionals focus on supporting patients' self-management in their treatment.	4.20 (0.75)	3.73 (1.09)
	26	Health care professionals are digitally literate.	4.13 (0.53)	3.78 (1.02)
	57	The health care professional can adapt to the changing relationship and needs of the patient.	4.09 (0.78)	3.55 (1.23)
	32	The health care professional knows at which moments in the care process, the patient can be supported with eHealth.	4.04 (0.54)	3.64 (0.98)
7. Attentiveness to the patient			4.27 (0.27)	3.92 (0.29)
	13	Personalized care: taking into account patient needs regard to (deployment of) eHealth.	4.58 (0.49)	3.96 (0.91)
	10	Clear communication to the patient about how care is offered.	4.50 (0.50)	4.33 (0.69)
	67	The patient has confidence in the eHealth application.	4.48 (0.64)	4.12 (0.71)
	43	Care with eHealth meets the needs of the target population.	4.36 (0.56)	3.74 (0.67)

Cluster	Nr	Factor	How important?[b] Mean (SD)	How feasible to measure?[c] Mean (SD)
	49	Patients receive practical support in using the eHealth application; for example, a help desk.	4.21 (0.41)	4.54 (0.64)
	72	The patient has flexibility to use eHealth where and when it is convenient.	4.16 (0.83)	4.09 (1.02)
	30	The patient has easy access to the necessary IT resources; for example, device, internet.	4.16 (0.77)	3.95 (1.02)
	6	Attention to patient eHealth literacy.	4.17 (0.70)	3.55 (1.08)
	56	The patient is open to treatment with eHealth.	4.43 (0.71)	3.83 (0.82)
	52	Clear expectations between patient and practitioner.	4.40 (0.63)	3.68 (1.09)
	54	There is personal attention for the patient.	4.38 (0.70)	3.91 (0.88)
	51	Prior to treatment, an assessment is made of whether eHealth can work for this patient.	4.22 (0.66)	3.55 (1.12)
	34	The patient is supported by his or her environment in the use of eHealth.	3.48 (0.85)	3.67 (0.99)
8. Organization outcomes			3.75 (0.35)	3.83 (0.15)
	3	eHealth leads to increased quality of health care services.	4.17 (0.55)	3.96 (0.89)
	76	Improvement of health care logistics; for example, waiting time, turnaround time, drop out, no-show, time per treatment.	3.88 (0.88)	4.04 (0.95)
	31	eHealth contributes to more meaningful care.	4.00 (0.75)	3.73 (1.09)
	9	eHealth provides opportunities to offer care in a more enjoyable way.	3.50 (0.65)	3.65 (1.09)
	77	eHealth affects the referrals rate.	3.20 (0.75)	3.78 (0.98)
9. End results for the patient			4.23 (0.32)	4.10 (0.17)
	75	eHealth has added value for the patient.	4.76 (0.43)	4.18 (0.83)
	68	The patient is satisfied.	4.42 (0.64)	4.40(0.63)
	65	Treatment with eHealth contributes to the patient's self-reliance.	4.28 (0.70)	4.17 (0.85)
	66	Improved patient quality of life.	4.39 (0.64)	3.92 (0.91)
	33	The patient can integrate the use of eHealth in his or her daily life.	4.32 (0.68)	4.09 (0.79)
	64	Treatment with eHealth has a positive influence on the patient's health.	4.32 (0.68)	4.04 (0.81)
	73	eHealth provides logistical convenience for the patient.	4.22 (0.66)	4.25 (0.78)
	71	The patient has easy access to care.	4.18 (0.57)	4.17 (0.75)
	69	The patient is satisfied with the knowledge and skills of the health care professional.	3.95 (0.64)	4.00 (0.72)
	53	Patient is therapy compliant.	3.48 (0.96)	3.75 (0.94)

[a] The numbers are rounded to two decimal places.

[b] "How important is this factor for effective patient care with eHealth?"

[c] "How feasible to measure is this factor?"

Appendix 2. Relocation factors and its reasons

Table 1. Relocation factors and descriptions of the reasons

Factor		Original cluster		Transfer to cluster		Reason transfer
26.	Health care professionals are digitally literate.	5.	Providing support to health care professionals	6.	Skills, knowledge, and attitude of professionals	Digital literacy is a skill.
29.	The health care professional is willing to learn to work with eHealth.	5.	Providing support to health care professionals	6.	Skills, knowledge, and attitude of professionals	Willing to learn is an attitude.
30.	The patient has easy access to the necessary IT resources; for example, device, internet.	2.	Quality eHealth application	7.	Attentiveness to the patient	Easy access to IT-resources concerns not the eHealth application itself but is a condition for access to eHealth.
39.	The eHealth application is suitable as a medical intervention.	1.	Quality IT infrastructure and systems	2.	Quality eHealth application	It concerns the eHealth application itself.
41.	Care delivery with eHealth complies with laws and regulations.	1.	Quality IT infrastructure and systems	4.	Vision, strategy, and organization	It concerns the vision, strategy, and how to organize hybrid health care.
44.	Treatment with eHealth is in line with community and regional needs and developments.	3.	Learning system: evaluation and continue improvement of hybrid care	4.	Vision, strategy, and organization	It concerns the vision, strategy, and how to organize hybrid health care.
48.	Make the work easier for the health care professional.	6.	Skills, knowledge, and attitude of professionals	5.	Providing support to health care professionals	It concerns a condition that a health care organization has to arrange.
54.	There is personal attention for the patient.	9.	End results for the patient	7.	Attentiveness to the patient	Personal attention is needed during the treatment.
55.	Use data to tailor the treatment to the patient's situation.	8.	Organization outcomes	3.	Learning system: evaluation and continue improvement of hybrid care	Tailoring the treatment to the patients' situation is needed during the treatment.
60.	Learn from each other through 'best and worst practices' or other forms of exchanging experiences	1.	Quality IT infrastructure and systems	3.	Learning system: evaluation and continue improvement of hybrid care	It concerns learning and improving.
61.	Built-in patient notifications.	8.	Organization outcomes	1.	Quality IT infrastructure and systems	Notifications has to be built in the IT-systems.

Factor	Original cluster	Transfer to cluster	Reason transfer
72. The patient has flexibility to use eHealth where and when it is convenient.	9. End results for the patient	7. Attentiveness to the patient	Using eHealth is needed during the treatment.
78. The costs of treatment with eHealth are transparent.	1. Quality IT infrastructure and systems	4. Vision, strategy, and organization	Providing transparent costs of hybrid health care is a part of the vision, strategy, and organization.

Appendix 3. Results of the votings 'Which clusters and factors to include in the model and questionnaire' and given comments by the advisory board

This appendix consists of two parts. The first part concerns the inclusion of the clusters in the quality management model. The second part concerns the inclusion of the factors in the accompanying questionnaire.

1. Results voting on which clusters the selected concept map should be included in the quality management model

Table 1. Results 'Which clusters should be included in the model?'

Which Clusters		First round[a]			Second Round[a]
		Yes (%)	No (%)	I don't know (%)	Yes[c] (%)
1	Quality IT infrastructure and systems	75	25	0	
2	Quality eHealth application	75	25	0	
3[b]	Learning system: evaluation and improvement	50	0	50	75
4	Vision, strategy, and organization	100	0	0	
5	Providing support to health care professionals	100	0	0	
6	Skills, knowledge and attitude health care professionals	75	25	0	
7	Attentiveness to the patient	100	0	0	
8	Organization outcomes	0	25	75	
9	End results for the patient	75	25	0	

[a] By more than 75% agreement, the cluster is operationalized in the quality management model resp. questionnaire.
[b] Cluster nr. 3 'learning system' was asked again in the second round.
[c] Percentage based on four people, including one no response.

Comments advisory group (the comments were placed unanimously) per cluster
Cluster 1. Quality IT infrastructure and systems

"You cannot deliver eHealth without a good quality system."
"It is challenging to integrate hybrid care into care processes without thinking carefully about your infrastructure."
"This can also become a prerequisite that needs to be established once. There is so much investment in IT that this is probably already high and not prohibitive."

Cluster 2. Quality eHealth application

"Because it determines the outcome for the patient."
"Quality and eHealth applications are transient. Therefore, it should be considered per model, but not in a guideline."
"An obvious limiting factor for implementation is that it is quickly done if it does not work (well)."

Cluster 3. Learning system: evaluation and improvement

Ronde 1:
"Evaluation is of importance but possible as a second step."
"Because we are in transition, it is precisely learning and a learning attitude essential for getting better. It is never right the first time."

Ronde 2:
"I believe measurability is important because it can help organizations demonstrate the effects of digitization within the health care."

Cluster 4. Vision, strategy, and organization

"Embedding within the organization is necessary."
"A vision and strategy to support the workflow are essential for proper embedding in an organization."
"With a vision, strategy and organization, the Board of Directors focuses on hybrid care and thus directs the organization. It is then no longer a toy."

Cluster 5. Providing support to care professionals

"To develop a positive attitude among health care professionals, support in applications is necessary."
"Without proper guidance, health care professionals will drop out at the slightest setback."

Cluster 6. Skills, knowledge, and attitude care professionals

"It can be merged with cluster 5."
"Not only are the buttons of the application needed but also learning to work with a patient remotely and support them in the use of eHealth."

Cluster 7. Attentiveness to the patient

"Hybrid care should take into account the patient's wishes and abilities."
"Personalize care also in eHealth because every patient differs in economic circumstances -equipment- education and ability to do things. Eye for the difference."

Cluster 8. Organization outcomes

"Relevant, but possibly just less relevant than the other parameters."
"For me, cluster 9 is less important."
"There is a much less straight line between e-health application and organization outcomes, at most some proxies like fewer repeat consultations."

Cluster 9. End results for the patient

"Departure and added value to the patient, both measurable and important."
"Bit analogous to cluster 7."
"The patient must always be taken into account. Both in the ability and inability."
"This is the most important outcome of all: if there is no result here, it can go in the garbage can."

2. Results voting on which factors of the selected concept map should be included in the questionnaire

Table 2. Results 'Which factors should be included in the model?'

Which factors		First round[a]	Second Round[a]
		Yes (%)	Yes[c] (%)
1	All factors	0	
2[b]	All factors in the Go-zone of each *cluster* or the Go-zone of the *total point* map with 78 factors.	50	50[c]
3	All factors in the zone '*importance*' of *each cluster* and in the *zone 'importance' of* the *total point map* with 78 factors, regardless the measurability.	0	
4	All factors in the Go-zone' of the *total point map* with 78 factors.	0	
5	All factors in the zone '*importance*' of the *total point map* with the 78 factors, whatever its measurability	0	
6[b]	All factors in the Go-zone of *each cluster*	25	0[c]
7[b]	All factors in the zone '*importance*' of *each cluster*, whatever its measurability	25	0[c]
8[b]	Other, namely .... Could be option 2, 6 or 7. It depends on the way it is incorporated into the questionnaire.	0	25[c]

[a] By more than 75% agreement, the factors are operationalized in the quality management model resp. questionnaire.

[b] Factors at questions nr. 2, 6-8 were asked again in the second round.

[c] Percentage based on four people, including one no response.

Explanation visualization Go-zones at the tables of each cluster (next pages)

Below each cluster tables stands the concerning Go-zone. The x-axis of the graph represents the mean ratings of the factors on the question "How important is this factor to successful patient care with eHealth" (in Dutch). The y-axis represents the mean rating of the factors on the question "How feasible to measure is this factor"? The upper-right quadrant (color green) is called the 'Go-zone' because it showed factors that were rated above the mean in both importance and measurability of the concerning cluster. In the lower-left quartile are the factors that have been scored as less important and measurable (color blue). The corresponding color of the zone is reflected in the tables. On the left side of each table, the color of the factor corresponds to the Go-zone of the belonging clusters.

In addition to the Go-zone per cluster, all factors are placed in a Go-zone with all 78 factors together. In this Go-zone, some factors just fall into a different quartile. The Go-zone with 78 factors is too large and cluttered to show it. Instead, the color of the corresponding quartile is shown on the right side of the table with the title "Quadrant 78 factors'.

The included factors are situated in the Go-zone of the concerning clusters (green in the left column of the table) or the Go-zone of the total point map (green in the right column of the table).

Cluster 1. Quality information technology infrastructure and systems

Description		Rating scores		Quadrant 78 factors
Conditions concerning technology, IT systems and data.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
12	Back -up scenario during technical problems.	4.21 (0.6)	4.17 (1.0)	
36	Technology is up-to date and works flawlessly	4.56 (0.6)	3.88 (1.0)	
59	Use of reliable data.	4.42 (0.6)	3.74 (1.0)	
40	Exchange of data possible between different system; for example, EPD, HIS, HIC.	4.25 (0.9)	3.73 (1.1)	
1	IT architecture available within the health care organization	4.13 (0.7)	4.36 (0.9)	
61	Built-in patient notifications.	3.64 (0.6)	4.67 (0.8)	

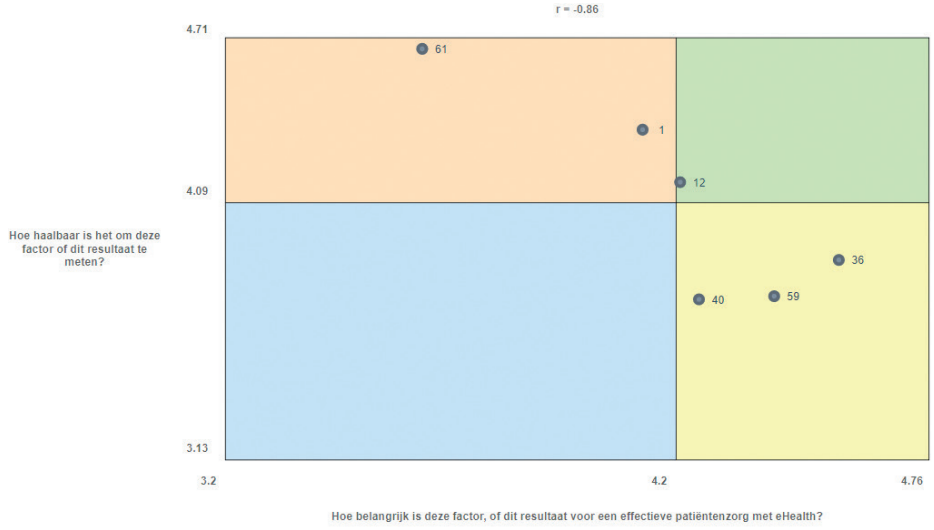


Figure 1. Go-zone cluster 1. Quality IT infrastructure and systems.

Cluster 2. Quality eHealth application

Description		Rating scores		Quadrant 78 factors
Conditions concerning the eHealth application.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
35	The eHealth application is user-friendly.	4.75 (0.4)	4.38 (0.7)	
39	The eHealth application is suitable as a medical intervention.	3.39 (1.2)	3.96 (0.9)	
37	The provision of care with eHealth is evidence-based.	3.73 (0.9)	3.71 (1.1)	
38	The eHealth application is also usable when the care needs are different than expected.	3.68 (0.9)	3.13 (1.1)	

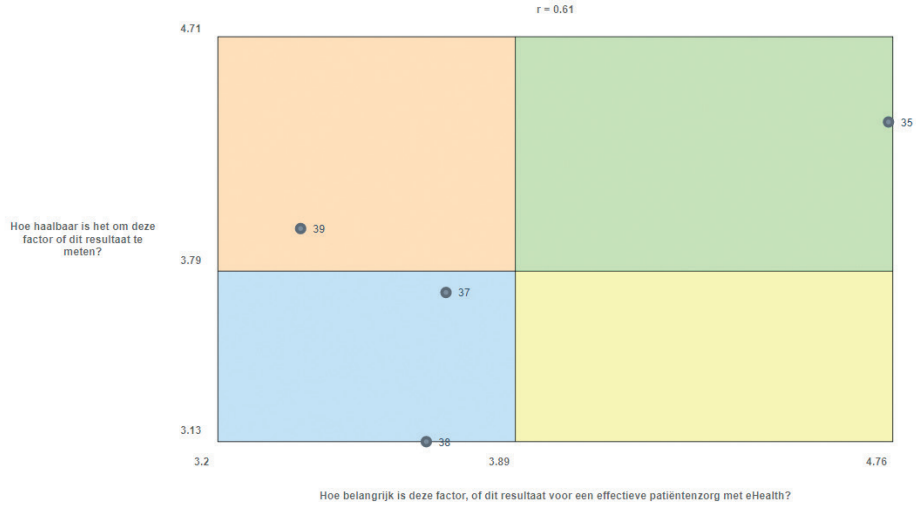


Figure 2. Go-zone cluster 2. Quality eHealth application.

Cluster 3. Learning system: evaluation and improvement

Description		Rating scores		Quadrant 78 factors
Evaluate and re-align with stakeholders and the patient care objectives for an continue development.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
8	Co-creation: eHealth is developed implemented and redeveloped with different stakeholders.	4.09 (0.7)	3.91 (1)	
58	Monitoring and evaluation of service and treatment results.	3.91 (0.7)	4.17 (0.8)	
60	Learn from each other through 'best and worst practices' or other forms of exchanging experiences.	3.75 (0.8)	3.58 (1.2)	
55	Use data to tailor the treatment to the patient's situation.	3.88 (0.8)	3.58 (1.0)	

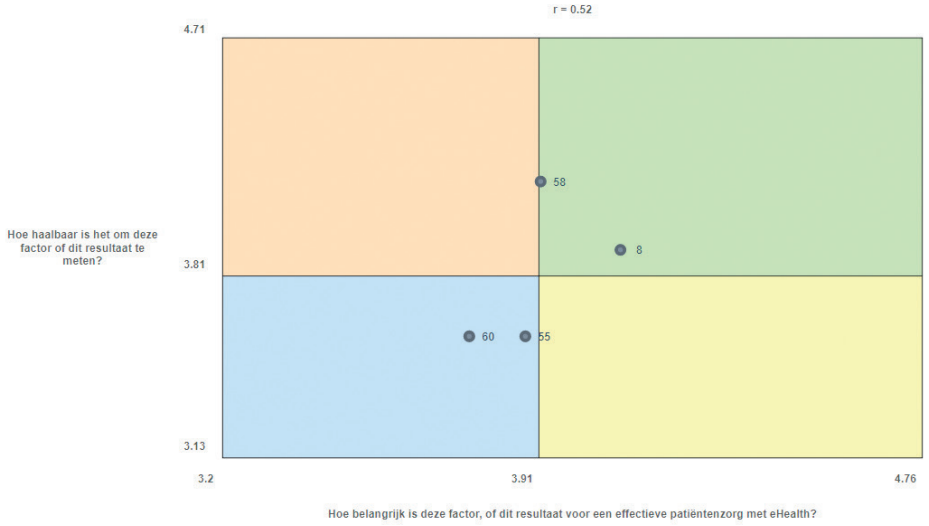


Figure 3. Go-zone cluster 3. Learning system: evaluation and improvement.

Cluster 4. Vision, strategy, and organization

Description		Rating scores		Quadrant 78 factors
Responsibilities of the health care organization concerning vision, strategy, policy, leadership, funding, and work process designs.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
41	Care delivery with eHealth complies with laws and regulations.	4.33 (0.7)	4.67 (0.5)	
16	Mobilizing funding for working with eHealth.	4.33 (0.9)	3.96 (1.2)	
21	Vision supported by the line, "Why are we doing this?"	4.33 (0.6)	3.86 (0.9)	
4	Support the implementation and development of eHealth in the organization with good project management.	4.29 (0.8)	4.00 (1.0)	
47	Redesign the current work process and review what contributes to the desired care outcomes.	4.23 (0.5)	4.00 (0.8)	
18	Clear internal policies regarding the use of eHealth.	4.17 (0.8)	3.96 (1)	
42	Financial reimbursements for eHealth deployment.	4.09 (0.9)	3.95 (1.1)	
23	Leadership: share the vision, mission, and strategy to create support.	4.08 (0.9)	3.79 (1.0)	
7	Set eHealth goals in your organization.	3.96 (0.7)	4.42 (0.7)	
5	Achievement of organizational goals concerning eHealth is invested in the organization.	3.95 (0.9)	3.96 (0.9)	
78	The costs of treatment with eHealth are transparent.	3.46 (0.9)	4.00 (0.9)	
24	Create urgency and direction within the organization: make eHealth part of every innovation and health care project.	3.96 (0.9)	3.57 (1.1)	
20	eHealth has added value for the strategy of the organization.	3.78 (0.9)	3.71 (1.1)	
63	Organize the work process in such a way that it becomes almost impossible to make mistakes.	3.73 (0.9)	3.22 (1.1)	
45	There is good collaboration with external partners.	3.54 (0.8)	3.26 (0.9)	
44	Treatment with eHealth is in line with community and regional needs and developments.	3.52 (0.8)	3.46 (1.2)	

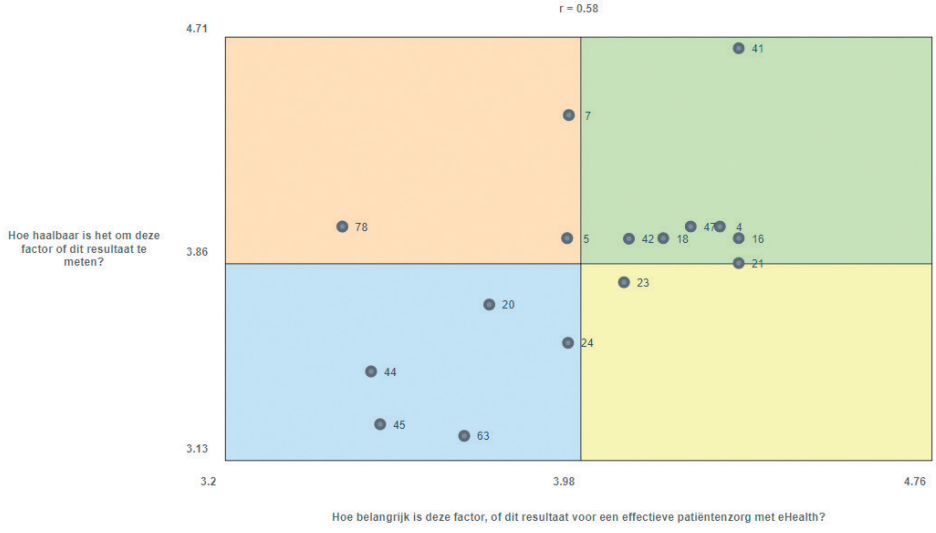


Figure 4. Go-zone cluster 4. Vision, strategy, and organization.

Cluster 5. Providing support to health care professionals

Description		Rating scores		Quadrant 78 factors
Conditions arranged by the health care organization to encourage the use of eHealth among its health care professionals.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
15	Training and supervision for health care professionals.	4.25 (0.6)	4.46 (0.8)	
2	Health care professionals have easy access to IT resources; for example, device, internet, screen, headset	4.25 (0.6)	4.17 (0.9)	
17	Helpdesk for health care professionals.	4.24 (0.6)	4.71 (0.5)	
19	Information on the treatment with eHealth is clear and accessible to the health care professional.	4.13 (0.6)	4.09 (0.7)	
11	Embedding eHealth in the daily practice of health care professionals.	4.29 (0.7)	4.00 (0.9)	
14	Staff are given time to (learn to) work with eHealth.	4.17 (0.7)	3.91 (0.8)	
62	Clear guidelines and protocols for health care professionals.	3.88 (0.6)	4.20 (0.8)	
48	Make the work easier for the health care professional.	3.92 (0.9)	3.74 (0.9)	
25	Strong collaboration concerning eHealth with your colleagues of different departments within your health care organization.	3.91 (0.7)	3.50 (0.8)	
22	Encourage and support the use of eHealth by 'ambassadors' in the teams.	3.70 (0.9)	3.54 (1.3)	

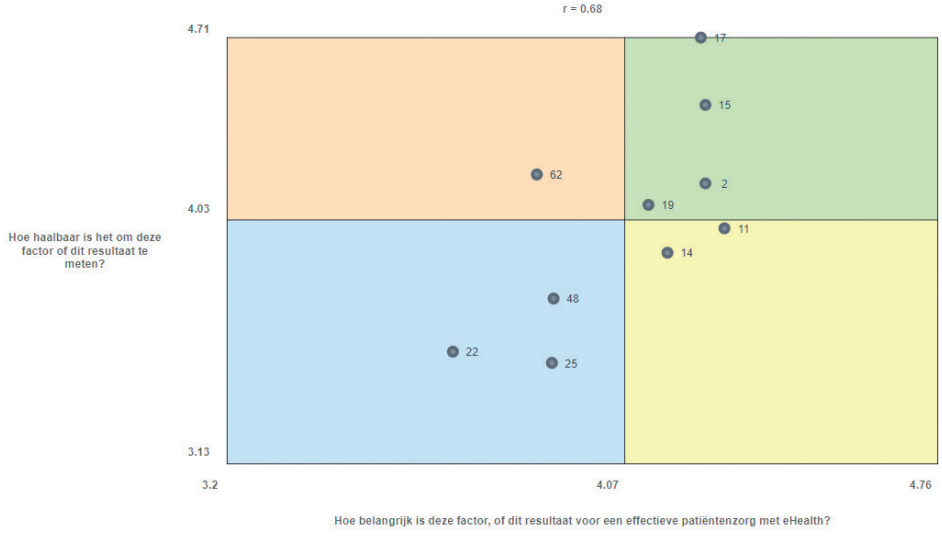


Figure 5. Go-zone cluster 5. Providing support toward health care professionals.

Cluster 6. Skills, knowledge, and attitude of professionals

Description		Rating scores		Quadrant 78 factors
Health care professional's ability to provide hybrid care.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
70	The health care professional has confidence in the eHealth application.	4.40 (0.6)	4.13 (0.8)	
46	Good balance between face-to-face and eHealth for the health care professional.	4.29 (0.7)	4.13 (1.0)	
29	The health care professional is willing to learn to work with eHealth.	4.32 (0.7)	3.72 (1.0)	
28	The health care professional recognizes the added value of eHealth.	4.33 (0.6)	3.68 (0.9)	
27	The health care professional feels comfortable working with eHealth.	4.17 (0.8)	3.83 (0.9)	
74	The health care professional is satisfied with working with eHealth.	4.12 (0.7)	4.04 (0.8)	
50	Health care professionals focus on supporting patients' self-management in their treatment.	4.20 (0.8)	3.73 (1.1)	
26	Health care professionals are digitally literate.	4.13 (0.5)	3.78 (1.0)	
57	The health care professional can adapt to the changing relationship and needs of the patient.	4.09 (0.8)	3.55 (1.2)	
32	The health care professional knows at which moments in the care process, the patient can be supported with eHealth.	4.04 (0.5)	3.64 (1.0)	

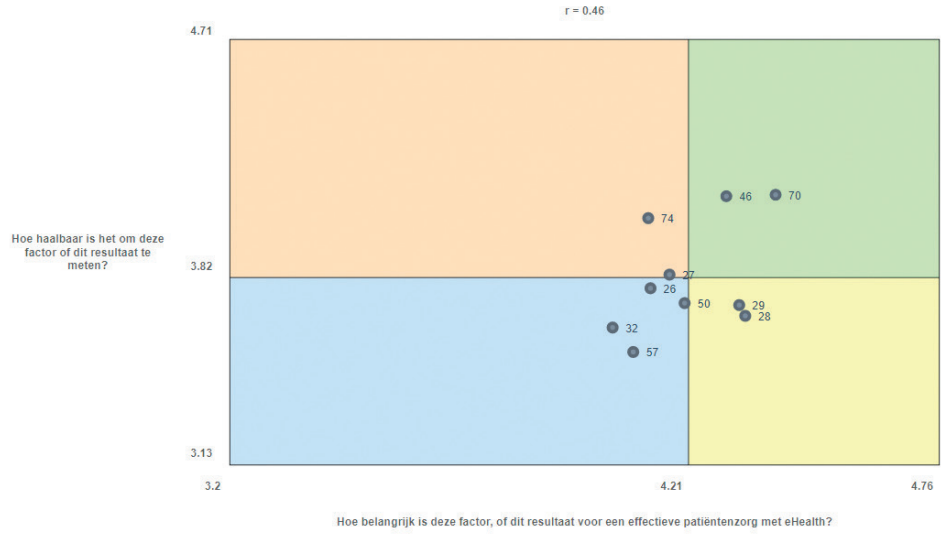


Figure 6. Go-zone cluster 6. Skills, knowledge, and attitude of professionals.

Cluster 7. Attentiveness to the patient

Description		Rating scores		Quadrant 78 factors
Organize the daily care process in line with the patient's needs, demand for care, and its capacity.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
6	Attention to patient eHealth literacy.	4.17 (0.7)	3.55 (1.1)	
13	Personalized care, considering patient needs with regard to (deployment of) eHealth	4.58 (0.5)	3.96 (0.9)	
10	Clear communication to the patient about how care is offered.	4.50 (0.5)	4.33 (0.7)	
67	The patient has confidence in the eHealth application.	4.48 (0.6)	4.12 (0.7)	
56	The patient is open to treatment with eHealth.	4.43 (0.7)	3.83 (0.8)	
52	Clear expectations between patient and practitioner.	4.40 (0.63)	3.68 (1.1)	
54	There is personal attention for the patient.	4.38 (0.7)	3.91 (0.9)	
43	Care with eHealth meets the needs of the target population.	4.36 (0.6)	3.74 (0.7)	
49	Patients receive practical support in using the eHealth application; for example, a help desk.	4.21 (0.4)	4.54 (0.6)	
72	The patient has flexibility to use eHealth where and when it is convenient.	4.16 (0.83)	4.09 (1.02)	
30	The patient has easy access to the necessary IT resources; for example, device, internet.	4.16 (0.8)	3.95 (1.0)	
51	Prior to treatment, an assessment is made of whether eHealth can work for this patient.	4.22 (0.7)	3.55 (1.12)	
34	The patient is supported by his or her environment in the use of eHealth.	3.48 (0.9)	3.67 (1.0)	

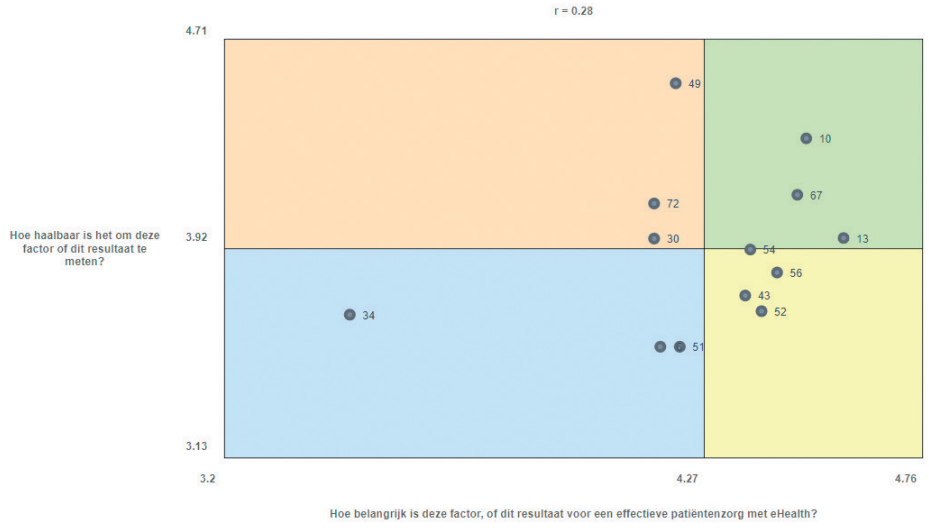


Figure 7. Go-zone cluster 7. Attentiveness to the patient.

Cluster 8. Organization outcomes

Description		Rating scores		Quadrant 78 factors
Outcomes for the health care organization.		Importance	Measurability	
Nr.	**Factors**	**Mean (SD)**	**Mean (SD)**	
3	eHealth leads to increased quality of health care services.	4.17 (0.6)	3.96 (0.9)	
76	Improvement of health care logistics; for example, waiting time, turnaround time, drop out, no-show, time per treatment.	3.88 (0.9)	4.04 (1.0)	
31	eHealth contributes to more meaningful care.	4.00 (0.8)	3.73 (1.1)	
9	eHealth provides opportunities to offer care in a more enjoyable way.	3.50 (0.7)	3.65 (1.1)	
77	eHealth affects the referrals rate.	3.20 (0.8)	3.78 (1.0)	

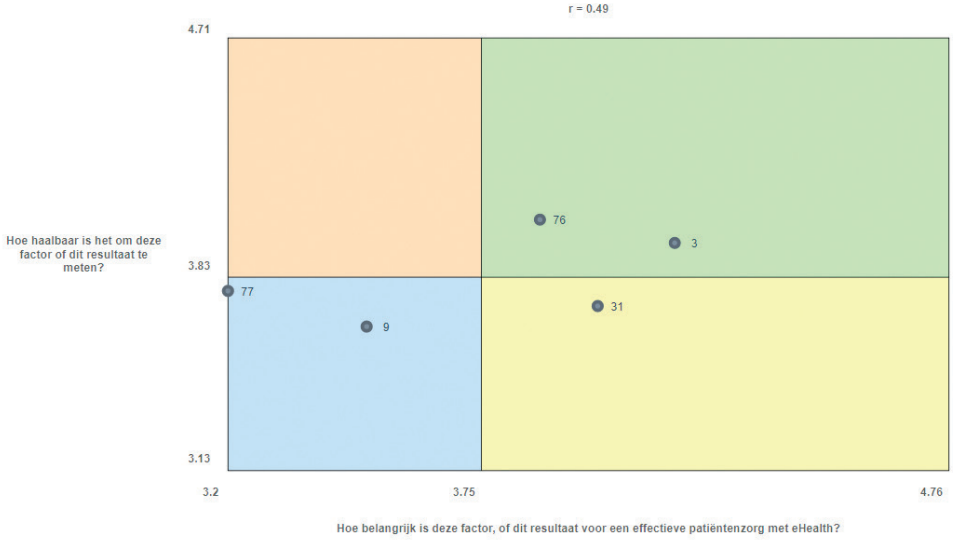


Figure 8. Go-zone cluster 8. Organization outcomes.

Cluster 9. End results for the patient

Description		Rating scores		Quadrant 78 factors
Outcomes for the patients; health, added value, satisfaction, ownership, convenience.		Importance	Measurability	
Nr.	**Factor**	**Mean (SD)**	**Mean (SD)**	
75	eHealth has added value for the patient.	4.76 (0.4)	4.18 (0.8)	
68	The patient is satisfied.	4.42 (0.6)	4.40(0.6)	
65	Treatment with eHealth contributes to the patient's self-reliance.	4.28 (0.7)	4.17 (0.9)	
66	Improved patient quality of life.	4.39 (0.6)	3.92 (0.9)	
33	The patient can integrate the use of eHealth in his or her daily life.	4.32 (0.7)	4.09 (0.8)	
64	Treatment with eHealth has a positive influence on the patient's health.	4.32 (0.7)	4.04 (0.8)	
73	eHealth provides logistical convenience for the patient.	4.22 (0.7)	4.25 (0.8)	
71	The patient has easy access to care.	4.18 (0.6)	4.17 (0.8)	
69	The patient is satisfied with the knowledge and skills of the health care professional.	3.95 (0.6)	4.00 (0.7)	
53	Patient is therapy compliant.	3.48 (1.0)	3.75 (0.9)	

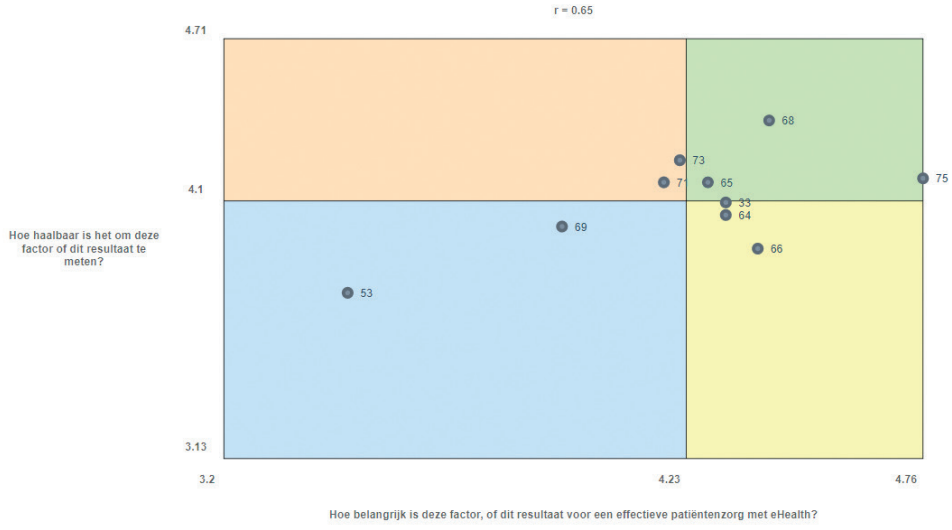


Figure 9. Go-zone cluster 9. End results for the patient.

Appendix 4. Suggestion utilization Hybrid Health Care Quality Assessment questionnaire

XLSX File (Microsoft Excel File), 84 KB

Excel File, tab 1

Background and objective Hybrid Health Care Quality Assessment

Health care organisations increasingly work with eHealth. However, the integration of eHealth into regular health care (called hybrid health care) is challenging. It requires organizations to change the way they work. Various factors at organizational, technological, process and personal-level impact the quality of hybrid health care (eHealth and face-to-face). For example, the roles of the health care provider and patient are changing, and the available resources are utilized differently. To ensure high quality of hybrid health care, the organizational structure and work processes need to be adapted.

To give health care organizations understanding which factors affect the quality of hybrid care, a quality management model with an accompanying self-assessment questionnaire has been developed. Together called the Hybrid Health Care Quality Assessment (HHQA). Health care organizations can use this model and questionnaire to organize hybrid health care and to identify improvement opportunities for a solid and sustainable integration of eHealth. The model and questionnaire can be used for any type of health care organization, type of eHealth tool or health care need.

The HHQA-model

The HHQA includes eight clusters. See Table 1 and Figure 1. Each cluster consist of the most important factors for the quality of hybrid health care.

Table 1. HHQA clusters and descriptions.

Cluster label	Description
Vision, strategy, and organization	Responsibilities of the health care organization concerning vision, strategy, policy, leadership, funding and work process designs.
Quality information technology infrastructure and systems	Conditions concerning technology, IT systems and data.
Quality eHealth application	Conditions concerning the eHealth application.
Providing support to health care professionals	Conditions arranged by the health care organization to encourage the use of eHealth among its health care professionals.
Attentiveness to the patient	Organize the daily care process in line with the patient's needs, demand for care, and its capacity.
Skills, knowledge, and attitude of professionals	Health care professional's ability to provide hybrid care.
End results for the patient	Outcomes for the patients; health, added value, satisfaction, ownership, convenience.
Learning system: evaluation and improvement	Evaluate and re-align with stakeholders and the patient care objectives for an continue development.

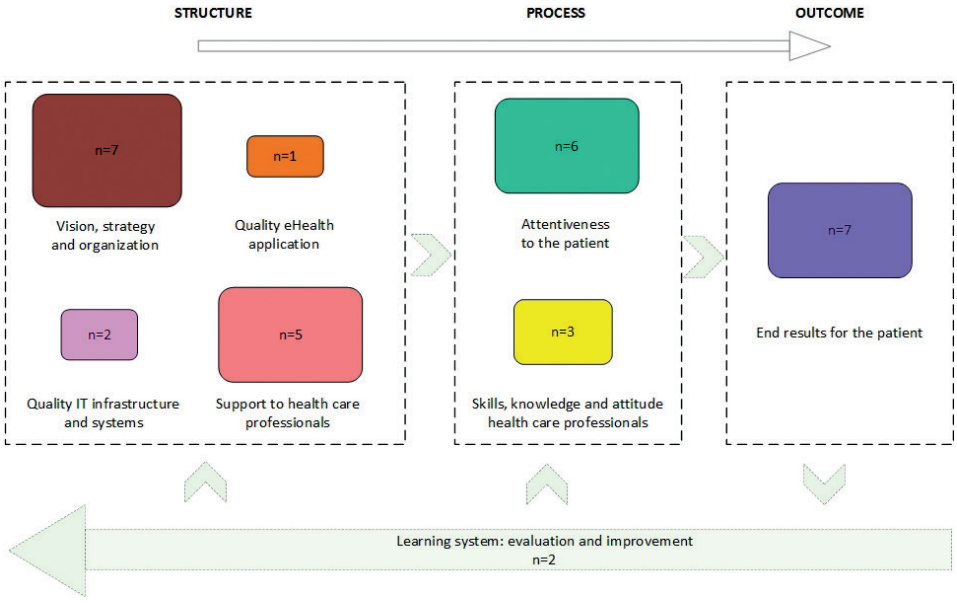


Figure 1. Hybrid Health Care Quality Assessment (HHQA).

Above the clusters, the Structure-Process-Outcome categories of Donabedian[1,2] are positioned as overarching themes to emphasize the interrelations between the clusters. Structure is the setting in which health care is provided, process is what is actually done in giving and receiving care and outcome is the consequence of the provided health care. The number inside the clusters represents the number of included factors, in total 33 factors.

The HHQA-questionnaire

In the questionnaire, each factor (33 in total) can be measured on how effective it is organized and how it develops over time. Per factor can be scored whether there is a plan, the quality of implementation, and to what extent the quality is evaluated and (re)developed with stakeholders. This score is done with the Plan-Do-Check-Act quality cycle of Deming[3] and converted into a ranking of 0 to 10 (0 = no plan, 10 = continuous improvement of this factor in co-creation with stakeholders). Subsequently, the main results of the questionnaire will be shown at cluster level in a spider diagram (see example below). Per cluster, it is possible to zoom into the corresponding factors. The scoring and how to fill in the questionnaire will be explained on the next tabblad.

Quality is something you do together. What quality is, is aligned with the expectations of the stakeholders. Therefore, the questionnaire includes how implementers of the plan experience something and how stakeholders receive the result (for example, by the management team beneath them or the patients). Use this questionnaire as a Quick Scan to gain insight into which factors are important for the quality of hybrid care.

Questionnaire results

The mean of each cluster will be displayed in a spider diagram. See the example below (Figure 2). This will provide an organization with insight into its strengths and opportunities for improvement at the cluster level. For each cluster, it is possible to zoom in to the corresponding factors by looking at the questionnaire scores. In this way, the organization can see for each factor what they have done well and where there are opportunities for improvement[a]. The questionnaire results can also be used to visualize the progress of the own improvements on a cluster level by using the questionnaire as a zero and intermediate measurement. Subsequently, use the questionnaire annually, depending on the speed at which your organization can implement improvement. The spider diagram will then show where improvements have been achieved at the cluster level.

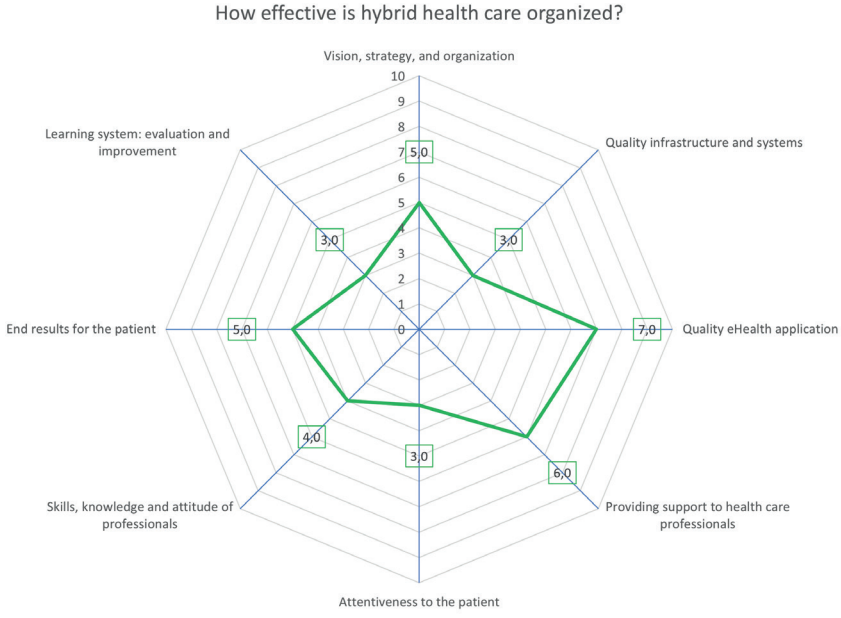


Figure 2. Example results HHQA questionnaire.

1. Donabedian A. The Quality of Care: How Can It Be Assessed? JAMA: The Journal of the American Medical Association. Published online 1988. doi:10.1001/jama.1988.03410120089033.
2. Donabedian A. Evaluating the quality of medical care. Milbank Quarterly. Published online 2005. doi:10.1111/j.1468-0009.2005.00397.x.
3. P.P.M. Harteloh and A.F. Casparie. Instituut Beleid and Management Gezondheidszorg. Kwaliteit van zorg. Van een zorginhoudelijke benadering naar een bedrijfskundige aanpak. Elsevier/ De Tijdstroom, 1998.

[a] The questionnaire results do not provide the health care organization with recommendations or concrete tips. The questionnaire will be further developed and expanded to include best practices and concrete tips in follow-up studies.

Excel file, tab 2

Instructions questionnaire
This questionnaire is completed with the stakeholders in your organization, i.e., the relevant target groups. Target groups include the Board of Directors, managers, staff, care providers and patients. These are the people who make the relevant plans, implement the plans and experience the effect of these plans. Use this questionnaire and the results primarily for dialogue and to inspire each other on possibilities for improvement.

The questionnaire shows how the factors of the clusters are rated. The clusters are: 1) Vision, strategy, and organization; 2) Quality infrastructure and systems; 3) Quality eHealth application; 4) Providing support toward health care professionals; 5) Attentiveness to the patient; 6) Skills, knowledge, and attitude health care professionals; 7) End results for the patient and 8) Learning system.

Each factor of the clusters is scored on how well it is in place (0=no plan, 10=continuous improvement of the factor in co-creation with stakeholders), using the plan-do-check-act (PDCA) quality cycle. The PDCA is a well-known cycle method for continuous improvement and quality measurement.[3] The plan-do-check-act cycle allows to assess the quality of each factor by measuring the extend to which; 'The objective is tangible?' (plan); 'The plan is implemented?' (do); 'To what extent is the plan realized?' (check) and 'Providing feedback on the quality of the execution to make improvements' (act). With a Likert-score from zero to ten, each factor can be monitored on the quality level of the PDCA-cycle. Zero means there is 'no plan to improve the concerning factor', and ten means 'continues improvement with stakeholders'.

Per factor, one score can be filled in from 0 to 10. Always look carefully at what each score means. The scores are explained below and in the next tab, above the questionnaire.

Is there no plan for a particular factor? Then fill in 0 (=no plan). Is the plan being implemented? Subsequently, ask those involved in implementing the plan (score 5) and those confronted with it to their experience (score 6). If the factor in question has gone through the entire PDCA cycle, is further developed in co-creation with various stakeholders and is evaluated with the other service and treatment results, fill in a 10 (Act).

For each factor, fill in what comes to your mind first.

Completing the questionnaire takes approximately 20 minutes.

Scoring based on the plan-do-check-act cycle

PLAN There is a plan to realize this factor with the desired results.
It contains the (SMART) objectives, available resources and intended activities.
The plan's method of reporting and assessing the implementation is laid down.
The relationship with other factors is also described in the plan.

Score	*Meaning*
0	Plan is not (yet) present.
1	Plan is present.
2	The plan clearly describes the connection with the other factors in the model (can be of the same or different cluster).

DO Actual implementation (specified in work instructions, vision plans)[1]

Score	*Meaning*
3	Execution is specified, but not yet/ or partly started.
4	The plan is implemented.

CHECK Check whether the implementation corresponds to the plan's intentions ("are the right things being done and experienced").[1] Checking occurs with the implementers of the plan or with the target groups who experience the effects of this.[1] Those who experience the plan's effects and implementation may be a different group than those who have drawn up or implemented the plan. For example, the managers and care professionals have drawn up the plans, but the patients are confronted with the effects.

Score	*Meaning*
5	Execution corresponds to the plans ("the right things are being done"), according to those who drew up the plans.
6	The intended results are experienced by the target group ("the right things are being experienced"), according to those confronted with implementation.
7	The effect of the factor is monitored together with other service and treatment results (these can also be results outside this model, such as clinical, financial or health care logistic results).

ACT The effect of implementation is considered in light of the plan's intentions. An explanation is sought for any discrepancies between the observed and intended effect. From this explanation, opportunities for improvement[1] are formulated.

Score	*Meaning*
8	Evaluation of discrepancies.
9	Suggestions for improvement (adjust plans or implementation).
10	Further development with various stakeholders.

The questionnaire results and an explanation are listed on the tab 'Results of the questionnaire'.

1. P.P.M. Harteloh and A.F. Casparie. Instituut Beleid and Management Gezondheidszorg. Kwaliteit van zorg. Van een zorginhoudelijke benadering naar een bedrijfskundige aanpak. Elsevier/ De Tijdstroom, 1998.

Excel file, tab 3

The questionnaire

Explanation PDCA-score

PLAN	
0	Plan is not (yet) present.
1	Plan is present.
2	The plan clearly describes the connection with the other factors in the model (can be of the same or different cluster).
DO	
3	Execution is specified, but not yet/ or partly started.
4	The plan is implemented.
CHECK	
5	Execution corresponds to the plans ("the right things are being done"), according to those who drew up the plans.
6	The intended results are experienced by the target group ("the right things are being experienced"), according to those confronted with implementation.
7	The effect of the factor is monitored together with other service and treatment results (these can also be results outside this model, such as clinical, financial or health care logistic results).
ACT	
8	Evaluation of discrepancies.
9	Suggestions for improvement (adjust plans or implementation).
10	Further development with various stakeholders.

				For each factor, specify the target group for whom it is being assessed, AND indicate the score of where it is in the PDCA phase*	
NR	NAME CLUSTER AND DESCRIPTION	NR	QUESTION	TARGET GROUP	PDCA-score (0-10)*
1	**Vision, strategy, and organization**	a	Care delivery with eHealth complies with laws and regulations.		
	Responsibilities of the health care organization concerning vision, strategy, policy, leadership, funding and work process designs.	b	Vision supported by the line: why are we doing this?		
		c	Clear internal policies regarding the use of eHealth.		
		d	Support the implementation and development of eHealth in the organization with good project management.		
		e	Financial reimbursements for eHealth deployment.		
		f	Mobilizing funding for working with eHealth.		
		g	Redesign the current work process and review what contributes to the desired care outcomes.		
				Mean PDCA score	#NAAM?
2	**Quality information technology infrastructure and systems**	a	IT architecture available within the health care organization.		
	Conditions concerning technology, IT systems and data.	b	Back -up scenario during technical problems.		
				Mean PDCA score	#NAAM?
3	**Quality eHealth application:** Conditions concerning the eHealth application.	a	The eHealth application is user-friendly.		
				Mean PDCA score	0,0
4	**Providing support to health care professionals**	a	Health care professionals have easy access to IT resources; for example, device, internet, screen, headset.		
	Conditions arranged by the health care organization to encourage the use of eHealth among its health care professionals.	b	Helpdesk for health care professionals.		
		c	Information on the treatment with eHealth is clear and accessible to the health care professional.		
		d	Training and supervision for health care professionals.		
		e	Embedding eHealth in the daily practice of health care professionals.		
				Mean PDCA score	#NAAM?
5	**Attentiveness to the patient**	a	Personalized care: taking into account patient needs regard to (deployment of) eHealth.		
	Organize the daily care process in line with the patient's needs, demand for care, and its capacity.	b	Clear communication to the patient about how care is offered.		
		c	The patient has confidence in the eHealth application.		
		d	Patients receive practical support in using the eHealth application; for example, a help desk.		
		e	The patient has flexibility to use eHealth where and when it is convenient.		
		f	The patient has easy access to the necessary IT resources; for example, device, internet.		
				Mean PDCA score	#NAAM?
6	**Skills, knowledge, and attitude of professionals**	a	Good balance between face-to-face and eHealth for the health care professional.		
	Health care professional's ability to provide hybrid care.	b	The health care professional has confidence in the eHealth application.		
		c	The health care professional is satisfied with working with eHealth.		
				Mean PDCA score	#NAAM?
7	**End results for the patient**	a	eHealth has added value for the patient.		
	Outcomes for the patients; health, added value, satisfaction, ownership, convenience	b	The patient is satisfied.		
		c	Treatment with eHealth contributes to the patient's self-reliance.		
		d	Treatment with eHealth has a positive influence on the patient's health.		
		e	The patient has easy access to care.		
		f	The patient can integrate the use of eHealth in his or her daily life.		
		g	eHealth provides logistical convenience for the patient.		
				Mean PDCA score	#NAAM?
8	**Learning system: evaluation and improvement**	a	Co-creation: eHealth is developed, implemented and redeveloped with different stakeholders.		
	Evaluate and re-align with stakeholders and the patient care objectives for an continue development	b	Monitoring and evaluation of service and treatment results.		
				Mean PDCA score	#NAAM?

Excel file, tab 4

Results questionnaire: How well is hybrid care organized in your organization?
The table and diagram below show the average PDCA score for each cluster. Below the diagram is an explanation of how to interpret the score. The scoring provides a general impression of the performance of the quality of hybrid health care and where there is room for improvement.

The scores from the table and diagram are the mean scores of the factors from the relevant cluster. The scores will give a general impression on which cluster the hybrid is effectively organized and where there is room for improvement. The mean score provides a direction. Next, look at improvement potential for each factor from the cluster in question. The score per factor is explained in the 'questionnaire instructions' tab.

Table 2. Results questionnaire (results visible after completing the questionnaire in Excel file, tab 3)

Theme	Mean score
Vision, strategy, and organization	
Quality information technology infrastructure and systems	
Quality eHealth application	
Providing support to health care professionals	
Attentiveness to the patient	
Skills, knowledge, and attitude of professionals	
End results for the patient	
Learning system: evaluation and improvement	

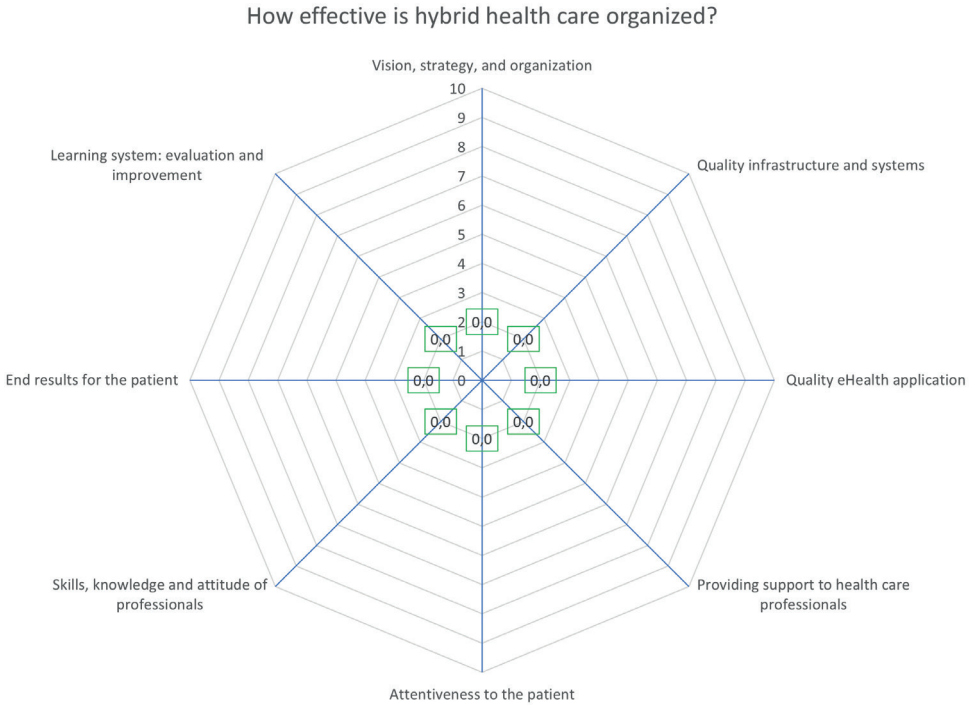


Figure 3. Results questionnaire (results visible after completing the questionnaire in Excel file, tab 3)

Score 0-2

If a cluster scores between 0 and 2, it means that many components (the so-called factors) are still in a 'plan phase', or perhaps there is no plan for some factors. Check per factor at this cluster whether there is a plan and whether connections are made with other factors in this plan. The connection can be at the same cluster but also from another cluster. Scientific research shows that the factors are not separate but reinforce each other. Make use of this when making your plans.

Tip: There is much information and tips about the PDCA and each phase on the internet. For example, in the Plan phase, make the objectives SMART (Specific, Measurable, Achievable, Realistic and anchored within a Time Frame), create owners of the plans who will monitor the plan's realization, set up control and monitoring data, and ensure that the intention is clear to the implementers.

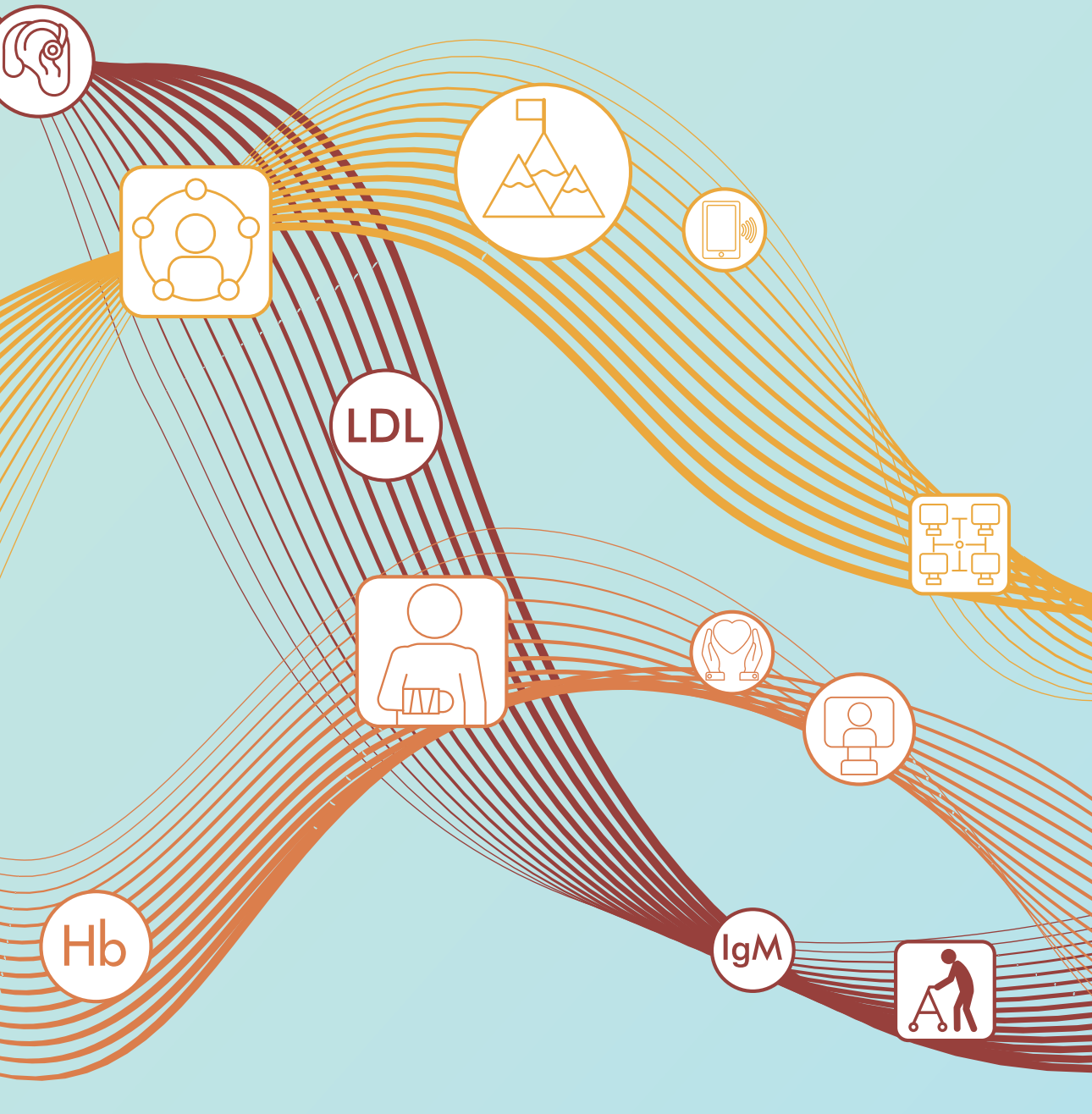
Score 3-6

Your organization is implementing the improvement plans, and perhaps some of the plans are already being evaluated and improved. For the relevant factor, look at how the activities are performing concerning the plans made. Then also include the objectives around this factor. Next, analyze the implementation, supported by the available data. If there is no data, arrange for this data as soon as possible. Otherwise, it is impossible

to evaluate the quality of the implementation. This will provide insight into where improvements can be made.

Tip: Look for best and worst practices in what lessons have been learned.

Score 7-10
On average, the factors in this cluster run through the entire PDCA cycle. However, for some factors, your organization redevelops the implementation or adjusts the plans with various stakeholders. Your organization has adopted a working method with a continuous improvement cycle for these factors. Perhaps it is possible to use this as best practice in organizing the factors where the PDCA score is lower? Based on the score per individual factor, you will gain insight into where there is still potential for improvement on the part in question.


LDL
Hb
IgM