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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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Summary

In recent years, the use of eHealth has been increasing. eHealth is seen as an innovative solution and a necessity to keep health care accessible and affordable. It provides convenient opportunities to transfer care from an institutional environment to the patient at home. Putting patients more in charge of managing their health affects patient and HCP interactions. Working with eHealth technology therefore requires patients and HCPs to develop new skills, and workflows need to adjust.

Integrating eHealth into health care is a complex organizational challenge. The usability of eHealth applications – the extent to which they benefit patients and are easy to use – must be carefully considered in order to fully support patients. At the same time, working with eHealth requires health care organizations to restructure the way they work. The usability of eHealth and the way it is integrated into health care are often not optimal. There is considerable knowledge to be gained in both areas. This thesis therefore had two aims: first, to investigate eHealth from a patient perspective and thereby test the usability of an eHealth application and its impact on users' self-efficacy; and second, to evaluate eHealth from an organizational perspective in order to explore the factors that contribute to high-quality hybrid health care (the combination of eHealth with in-person care). **Chapter 1**, the introduction, describes the background to this thesis and the research aims. The main body of this thesis is divided into two parts: first, the patient perspective; and second, the organizational perspective.

Part 1. Evaluation of eHealth From a Patient Perspective: Assessment of an Online Patient Portal

In the first part, patients who visited an online patient portal communicating laboratory results in patient-friendly language were asked to evaluate this portal for its usability and the impact on their self-efficacy. Portal usability is essential to ensure that patients receive their test results online, that it is easy to use and provides understandable information. Perceived self-efficacy is a person's confidence in his or her ability to execute necessary behaviours. Both usability and self-efficacy affect an individual's intention to follow up on their test results.

Two cross-sectional studies (**Chapters 2 and 3**) examined patients' attitudes toward an online patient portal. The studies were conducted using the eHIQ questionnaire. The eHIQ Information and Presentation subscale was used to assess the usability of the patient portal, while the eHIQ Motivation and Confidence to Act subscale was used to assess self-efficacy to determine whether patients were motivated to act on the information they were shown.

In the first study **(Chapter 2),** the questionnaire was completed by 354 patients. This study found that the usability of the portal was evaluated positively, and the participants had high confidence in the portal. A positive correlation was found between usability and self-efficacy, meaning that if patients found the portal easy to use, it had a positive effect on their self-efficacy. However, the portal only slightly supported patients to take an active role in managing their health. The second study **(Chapter 3)** repeated the first study with

a larger group in order to examine how different groups of patients perceived the portal. The characteristics explored were age, gender, education and type of chronic disease. The eHIQ was completed by 748 patients. This study found that the higher-educated users of the patient portal reported lower scores for usability and self-efficacy. Lower usability scores were also reported by the elderly and by patients with a diagnosis of asthma or COPD. This study showed that the way in which a patient portal communicates information must be tailored to different target groups. Further research is necessary to determine the supportive factors that users in these different groups consider important in a results portal to tailor it to their needs. Further research is also needed on how portals can be optimally implemented and integrated into daily general practice.

Part 2. Evaluation of eHealth From an Organizational Perspective: What Factors Affect the Quality of Hybrid Health Care?

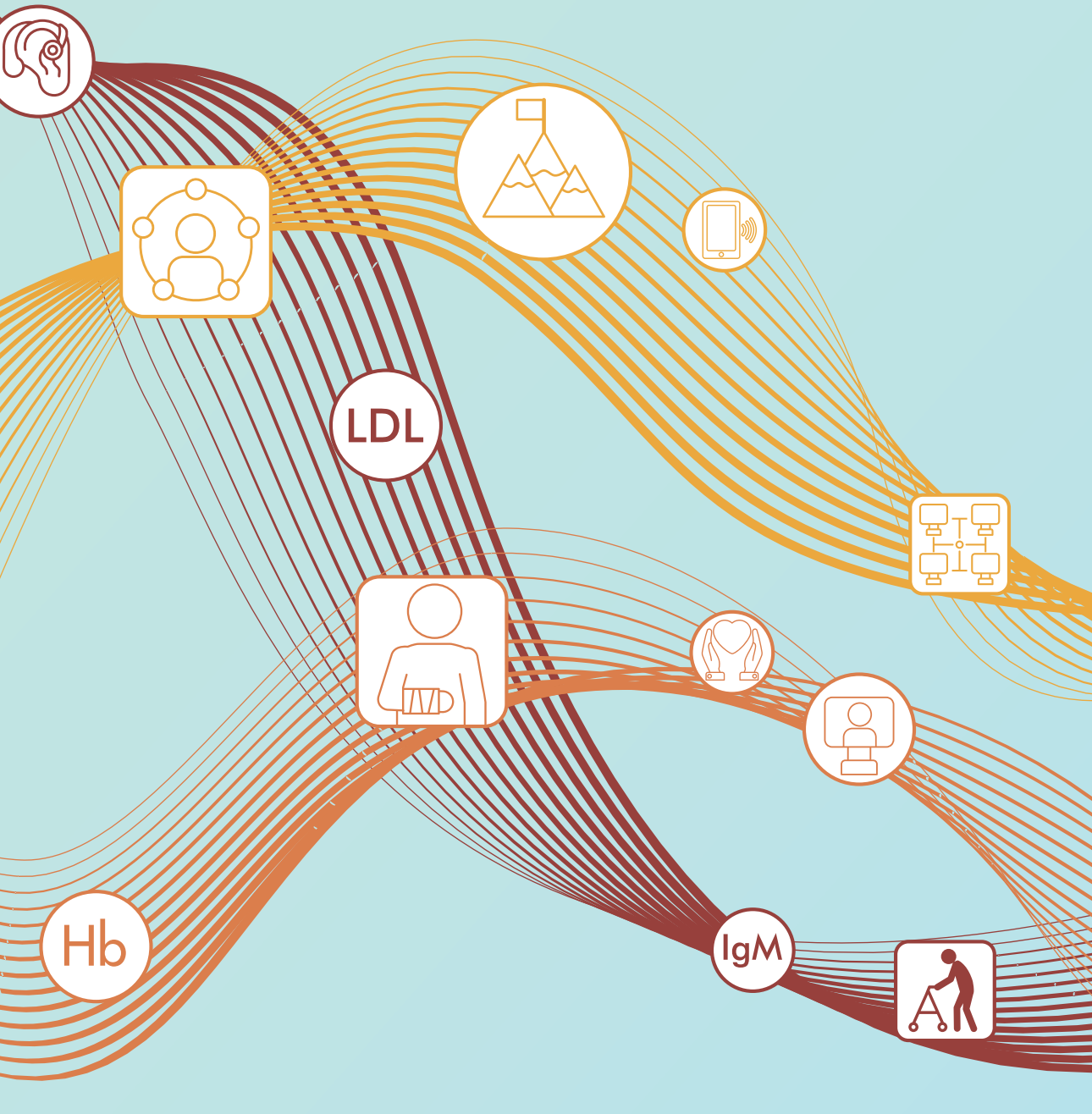
eHealth is most effective when it is optimally blended with in-person care in a "hybrid" health care model. However, organizing hybrid health care is challenging, and preparation and management are often ineffective. There is a need for knowledge on how hybrid health care can be improved to provide added value for patients and HCPs working with eHealth.

In the second part of this thesis, a systematic literature review **(Chapter 4)** and a concept mapping study **(Chapter 5)** were used to explore the factors relating to the effective organization of hybrid health care. Based on the findings, a quality management model for hybrid care was developed. Both studies used the Donabedian Stucture-Process-Outcome (SPO) framework, in which structure is the care setting itself and the available resources; process is the delivery of care; and outcomes are the end result of care. According to Donabedian, the quality of care is dependent on these three categories and the relationships between them.

As part of the systematic literature review, 739 studies were screened, focusing on the implementation and evaluation of eHealth and describing potential structure, process or outcome indicators **(Chapter 4).** Eleven of those studies were included in the review. Data extraction sheets were designed to provide an overview of the study characteristics, eHealth characteristics and indicators. Indicators with a potential impact on the integration of eHealth in health care were extracted and organized into themes and subthemes of structure, process and outcome categories. We also analyzed whether the indicators influenced each other. Altogether, a total of 111 unique indicators were extracted. Looking at these indicators overall, three main principles can be distinguished. First, the role of the patient must be embedded in the organizational structure and the care process; second, the technology must be aligned with the organizational structure and the care process; and third, the staffing of the care process needs to be aligned with the desired outcomes. Inadequate attention to these principles can have a negative impact on the organization, the care process and/or the outcomes.

To translate the findings from the literature study into a guide for health care organizations, a model was developed to help health care organizations manage hybrid health care and identify areas for improvement in order to integrate eHealth in a robust and sustainable manner. A concept mapping study **(Chapter 5)** was used to enrich and validate the evidence base from the literature review with practice-based knowledge from experts. The participants (n = 39) consisted of HCPs, managers, researchers, patients and eHealth suppliers who were all familiar with eHealth. First, a brainstorming exercise was conducted in which participants listed all the factors contributing to the effective organization of hybrid health care and the associated outcomes. These factors were combined with the factors identified from the literature study to produce a list of 314 factors. After removing duplicates, 78 factors remained. Participants then rated the factors on their importance and measurability. Participants were asked to group factors that were related to each other into clusters. Information from the various participants was combined and, using a multivariate statistical and qualitative analysis, the 33 most important factors were grouped into eight clusters: 1. Vision, strategy and organization; 2. Quality of IT infrastructure and systems; 3. Quality of eHealth application; 4. Providing support to HCPs; 5. Skills, knowledge and attitude of HCPs; 6. Attentiveness to the patient; 7. End results for the patient; and 8. Learning system. The SPO categories were positioned as overarching themes to emphasize the relationships between the clusters. A proposed model was then developed for using the self-assessment questionnaire in practice, making it possible to measure the quality of each factor and its development over time. The model and questionnaire were jointly renamed the Hybrid Health Care Quality Assessment (HHQA).

Chapter 6 reflects on the findings and the methodology of the studies, including suggestions for follow-up research and practice. It was concluded that the effective organization of eHealth is determined by a complex interplay of organizational, technical, process-related and human factors. Achieving high-quality hybrid health care requires consideration of the changing personal needs of patients, the patient-HCP-eHealth relationship and the organizational design. Health care organizations can use the HHQA to evaluate the quality of hybrid health care and identify areas for improvement. The model and questionnaire act as a mirror, reflecting what needs to be done. At the end of the chapter, suggestions are made for practice and further research, such as validating the HHQA, interventional research, repeating concept mapping studies in other health care environments such as low-resource settings, and weighting the factors based on the extent of their impact on the quality of hybrid health care. Finally, the HHQA is illustrated using a case study.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