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 1

General introduction

eHealth

Health care is facing major challenges. Demand is rising and patient needs are increasingly complex due to an ageing population and the growing prevalence of chronic diseases. Simultaneously, the cost of health care and staff shortages are soaring, with accessibility issues as a consequence.[1,2] Pressure on the health care sector has become huge during the COVID-19 pandemic,[3] emphasizing the need for a transformation of access to care. Continuity of care needs to be secured even in times of limited access to conventional face-to-face care.[4] Innovative solutions, such as eHealth, are therefore needed to ensure access to high-quality care.[5–7]

eHealth is the application of digital information and communication to support and improve personal health and personalized health care for the patient.[8] eHealth applications include tools for communication between patients and health care professionals (HCPs), or between HCPs, such as video calls, patient portals and clinical decision support systems. eHealth applications also provide opportunities to transfer care from an institutional environment to the patient at home. Patients have more rapid access to suitable information with more options to manage their care, which can lead to higher engagement and self-management.[8] Higher patient engagement often also results in better outcomes.[9–11] eHealth is most effective when it is fully integrated into the health care system[7,12] in a "hybrid" model that combines eHealth with conventional in-person care.[13,14] Despite the increasing use of eHealth, questions remain about both the usability of these applications and the effective organization of hybrid health care.[15] The case study below illustrates some of the issues involved.

Case Study: Communicating Laboratory Results via an Online Portal

Nancy has an underactive thyroid. She takes medication for her condition, and needs to be on the right dose, since if it is not properly adjusted, it affects her hormone levels. In the past, Nancy has gained weight, been constantly tired and felt depressed. To prevent this, she goes to a diagnostic centre for blood tests every 6 to 13 weeks so her medication can be adjusted, and visits her general practitioner (GP) once a year. Nancy and her doctor can receive her laboratory test results via an online portal. Sometimes she sees that her results are slightly off. However, the portal does not explain how far from the target level they are, so she contacts her GP to share her concerns about whether she is on the right dose. Her dose almost always needs to be adjusted. Nancy wishes the online results were clearly explained and accompanied by advice about whether she should contact her GP. However, thanks to direct access to her laboratory test results and guidance from her GP, Nancy has her thyroid condition under control and is feeling well.

Paul is Nancy's GP and has a very busy practice. His workload has been increasing for several years, partly because he is seeing more and more patients with chronic conditions and complex issues, and partly due to the increased administrative burden associated with the new digital solutions. While these improve diagnostic reliability, each device has slightly different instructions. Paul feels as if he spends more time sending digital information than on diagnosis and treatment. He sometimes sees patients who have difficulties with eHealth applications, such as Nancy, and wishes the results portal provided patients with clearer explanations regarding their health information. The introduction of the online portal was expected to reduce patient visits to once a year, but instead Paul sees patients more than he did before, and the content of their consultations has changed. Before the online portal was introduced, Paul would explain Nancy's blood test results and her medication, but now he coaches Nancy on how to listen to and interpret her body's signals in conjunction with her test results.

Effective Organization of eHealth

This case study shows that the online portal does not provide adequate information to support Nancy's self-management. In combination with Paul's in-person care, however, Nancy is experiencing much better health outcomes than before. Paul is also benefiting from eHealth, but it is not yet embedded in his daily practice: he sees patients more than he did before, the content of their consultations has changed and the administrative burden has increased. Although hybrid health care is helpful for Nancy, working with eHealth is not effective for Paul.

Like Paul, many HCPs view eHealth as an extra burden rather than something that supports their work. In addition, they often experience faltering technology, have to use different communication channels, have inadequate digital skills and are concerned about data privacy.[16–22] These issues negatively affect their (perceived) workload and satisfaction levels, sometimes at the expense of quality care.[16–22] eHealth also reshapes the patient–HCP relationship, with the HCP taking on a coaching role.[23,24] The organizational structure and workflows in health care need to evolve to support HCPs in their daily practice, when working with eHealth.[12,25–28]

Hybrid health care offers many opportunities. To optimize the quality of hybrid health care, digital applications must benefit patients[6] and be easy to use, and health care organizations need to restructure the way they work to support the delivery of patient care.[12,25–28]

Thesis Objectives

The objectives of this research are twofold:

- to investigate the usability of an eHealth application and the impact on users' self-efficacy, from a patient perspective;

- and to analyze the factors that contribute to high-quality hybrid health care, from an organizational perspective.

The first part of the thesis explores perceived usability and self-efficacy with a case study, assessing patients' attitudes toward an online patient portal communicating laboratory test results. The second part of the thesis focuses on the factors that contribute to high-quality hybrid health care, and how to assess its quality. A hybrid health care quality model and an accompanying self-assessment questionnaire are also developed to help health care organizations identify possible areas for improvement in order to integrate eHealth in a robust and sustainable manner.

The Main Research Objectives of This Thesis Are as Follows:
Part 1. Evaluation of eHealth from a Patient Perspective: Assessment of an Online Patient Portal

1. To investigate the perceived usability and impact on patients' self-efficacy of using an online patient portal that communicates laboratory test results in patient-friendly language.

2. To assess the effect of patient characteristics (gender, age, education and type of chronic disease) on perceived usability and self-efficacy using an online patient portal for laboratory test results.

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

1. To investigate which indicators in the structure, process and outcome categories affect the successful integration of eHealth into regular health care and investigate which structure and process indicators are related to outcome indicators.

2. To develop a quality assessment model for organizing hybrid health care with an accompanying self-assessment questionnaire.

Thesis Outline

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

The first part of this thesis describes patients' attitudes toward an online patient portal that communicates laboratory test results in patient-friendly language. The study participants were patients who visited the portal to view their results after having a blood test at a primary care diagnostic centre and laboratory in the Netherlands. Patients who viewed their test results on the portal were automatically invited to complete the eHealth Impact Questionnaire (eHIQ). The usability of the patient portal was assessed using the Information and Presentation subscale of the eHIQ, and patients' self-efficacy was assessed using the Motivation and Confidence to Act subscale, to determine whether they were motivated to act on the information they were shown.[29,30]

Chapter 2 describes a quantitative study analyzing patients' attitudes toward the portal using two subscales of the eHIQ and exploring the correlation between the usability and self-efficacy outcomes. **Chapter 3** presents a replication of this study with a larger number of participants, evaluating the effects of gender, age, education and type of chronic disease on usability and self-efficacy.

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

The second part of the thesis focuses on the organization of hybrid health care using the Donabedian structure, process and outcomes (SPO) framework, in which structure is the health care setting and available resources; process is what is done in giving and receiving care; and outcomes are the end results of health services.[31–33] According to Donabedian, health care quality is based on aspects of these three categories and the relationships between them: improvements in structure can improve a process, which is likely to improve outcomes.

Chapter 4 describes a systematic literature review using the Donabedian SPO framework to investigate which indicators might be related to the integration of eHealth into health care.

Chapter 5 enriches and validates the evidence base derived from the literature review with practical knowledge from experts. This study uses the concept mapping method to develop a quality assessment management model designed to support health care organizations to improve the organization and quality of their hybrid health care.

Discussion

To conclude, **Chapter 6** reflects on the findings of this thesis, putting them into context, discussing the methodological choices made, and making suggestions for further research and practice.

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