

Understanding Healthcare Professionals' Motivations and Drivers for eHealth Adoption

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Abstract: This case study examines the use of an eHealth application for improving preoperative rehabilitation (prehabilitation). We have analysed healthcare professionals' motivators and drivers for adopting eHealth for a surgical procedure at academic medical facilities. The research focused on when and why healthcare professionals are inclined to adopt eHealth applications in their way of working? For this qualitative study, we selected 12 professionals involved in all levels of the organisation and stages of the medical process and conducted semi-structured interviews. Kotter's transformational change model and the Technology Acceptance Model were used as analytical frameworks for the identification of the motivation of eHealth adoption. The findings suggest that contrary to Kotter's change model, which argues that adoption of change is based on perceptions and feelings, the healthcare drivers are rational when it comes to deciding whether or not to adopt eHealth apps. This study further elaborates the observation made by the Dutch expertise centre on eHealth, Nictiz, that when the value of an eHealth application is clear for a stakeholder, the adoption process accelerates. Analysis of the motivations and drivers of the healthcare professionals show a strong relationship with an evidence-based grounding of usefulness and the responsibility these professionals have towards their patients. We found that healthcare professionals respond to the primary goal of improving healthcare. This is true if the eHealth application will innovate their work, but mainly when the application will improve the patient care they are responsible for. When eHealth applications are implemented, rational facts need to be collected in a study before deployment of eHealth applications on how these applications will improve the patient's health or wellbeing throughout their so-called medical journey for their treatment. Furthermore, the preference to learn about new eHealth applications from someone who speaks from authority through expertise on the subject matter, suggests adoption by healthcare professionals may be accelerated through peers. The result of this study may provide healthcare management with a different approach to their eHealth strategy. Future research is needed to validate the findings in different medical organisational settings such as regional healthcare facilities or for-profit centers which do not necessarily have an innovation focus but are driven by other strategic drivers.

Keywords: eHealth, Innovation, Adoption, Motivation, Leadership

1. Introduction

In the OECD guidelines, one of the main aims is to reduce wasteful spending in healthcare and to be more effective and resilient. More resilient European healthcare systems are necessary to efficiently respond to changing healthcare needs driven by the ageing population in the EU (OECD/EU, 2018). Healthcare in the Netherlands is under pressure due to an ageing population and rising healthcare expenses (NFU, 2018). eHealth can potentially facilitate this sector (OECD/EU, 2018). eHealth refers to "the use of emerging information and communications technology to improve or enable health and healthcare" (Eng, 2001). According to Nictiz, the Dutch centre of expertise for standardisation and eHealth eHealth can create a decrease in pressure in the workplace. Through digital care, meaning eHealth, patients' self-management and control of their care can be increased (Nictiz, 2019). eHealth, in general can create opportunities for remote healthcare (NFU, 2018). The trend to shift the balance to more remote healthcare is one of the ways eHealth can potentially facilitate the healthcare sector (OECD/EU, 2018).

Hennemann et al. (2017) have found that acceptance of eHealth interventions is relatively low. Moreover, Faber et al. (2017) observed that the process of introducing eHealth in the Netherlands often stops after initial interest/commitment to the project. So, the healthcare sector is a late adopter of information technologies (Norris, 2009).

Faber et al. (2017) studied how the organisational context influences the adoption and speed of the adoption of eHealth. They found that five organisational factors influence the adoption: 'the size of the hospital', 'support of top management', 'organisational readiness', 'centralisation in decision-making' and 'absorptive capacity'. Based on the eHealth-monitor 2018 survey results, Nictiz (2018) concludes that the eHealth transformation process has developed at different speeds. Furthermore, Nictiz (2018) observed the most progress in

applications used solely by the healthcare providers. Less progress was seen when 1) the healthcare provider and the healthcare user both perform a task in the process, 2) the value of the eHealth application is unclear, 3) there is no sense of urgency, and/or 3) when the traditional process needs to change or becomes more complex due to the introduction of eHealth. Wu (2011) suggests that more studies on adoption by healthcare professionals are needed to promote these innovations in hospitals effectively. For example, Dehzad et al. (2014) focused on eHealth adoption in the Netherlands, particularly the barriers to adoption. While these studies mainly examined the organisational factors that influence eHealth adoption, questions remain on when and why healthcare professionals adopt eHealth.

The academic research available illustrating when and why healthcare professionals adopt eHealth is sparse. A specific framework illustrating drivers to adopt eHealth by these professionals seems not yet available. We apply the framework from Kotter (2002) to understand motivations to adopt change. Kotter argues that people change their behaviour based on emotion rather than rational facts. We aim to conceptualise a framework including drivers for adopting eHealth based on ratio or emotion, and this research explores if Kotter's assertion holds up in a hospital setting. The research question of this study is: *What are the motivators and drivers inclining healthcare professionals to adopt eHealth applications in their way of working?*

Furthermore, we illustrate how the healthcare professionals' adoption of an eHealth application is a boundary condition for the success of eHealth.

2. Adopting eHealth - Drawing from Literature

Rogers (1983) argues that adoption is a choice to use innovation as the best available option. Adopting a change is a process that results in the use of a new product, process or behaviour, such as with the introduction of eHealth applications.

One of the change management models successfully used in healthcare, especially when addressing the adoption of technological innovations, is Kotter's eight-stage process for transformational change (Campbell, 2008). This model describes eight stages divided into three phases: 1) creating a climate for change; 2) engaging and enabling the organisation and 3) implementing and sustaining the change (Kotter, 1995). The author warns that potential barriers and individual motivational factors can lead to failure in implementing organisational change.

The two most important barriers for adopting eHealth in the Netherlands are: 'integration and interoperability' and 'business case' (Dehzad et al., 2014). The barrier integration and interoperability state that it is challenging to integrate mobile applications in the current IT systems. However, this contradicts the claim by the Dutch association of academic medical centers that the Netherlands has excellent ICT-preconditions for implementing eHealth (NFU, 2018). The other important barrier referred to as 'business case' deals with the high-risk investment needed to make in an unsure market. In total, twelve organisational barriers are identified by Dehzad et al. (2014). We have identified the following barriers of their study to be related to the healthcare professionals' motivation for adopting eHealth:

1. *Visionless development*: when the focus and vision for added value are lacking, this is seen as a barrier;
2. *Not adapted to healthcare professionals*, this occurs when the end-users - the healthcare professionals - are not involved in the development of new technologies. This impedes healthcare professionals to adapt to new technologies in their work environment;
3. *Lack of evidence*: insufficient evidence of clinical outcomes, efficiency and/or effectiveness is a barrier to eHealth adoption.

3. Propositions

A systematic review by Granja et al. (2018) identified factors determining the success and failure of eHealth interventions, identified several barriers and success factors. Some of their success factors are contrasted with the barriers mentioned before.

We use the concepts of a Technology Acceptance Model (TAM) in our analysis as such models provide insights into factors influencing the adoption of technology (Davis et al., 1989).

When looking into the factor ‘perceived usefulness’ from TAM it can be deduced that the perceived usefulness of the system influences eHealth adoption. The perceived usefulness of the systems is a positive factor in implementing an eHealth application (Castillo et al., 2010; Reychav et al., 2018).

Waneka & Spetz (2010) describe positive healthcare professionals attitudes as believing the system would benefit the patient. Moreover, Nictiz (2018) observed that when the value and urgency of the application were clear, the adoption rate tended to increase. When the eHealth application is perceived as useful, the perceived value of the application increases. Subsequently, this would decrease the barrier of visionless development and increase eHealth adoption. Therefore, ‘*Perceived as valuable*’ is included as a motivator in this research framework. We state the following proposition:

H1. When the eHealth application is *perceived as valuable*, this is a motivator for adopting eHealth.

The *perceived ease of use* is another factor of TAM (Davis et al., 1989) by which adoption of technology can be predicted. Reychav et al. (2018) have found perceived ease of use a positive factor for eHealth adoption. The expected effort of using a well-adapted eHealth application would be seen as low. Effort expectancy is thus seen as a factor influencing eHealth adoption (Hoogenbosch et al., 2018). As this could counter the previously named barrier of an ill-adapted application to healthcare, we include the *perceived ease of use* as a possible motivator and propose the following:

H2. When the eHealth application is *perceived as easy to use*, this is a motivator for adopting eHealth.

As insufficient evidence of clinical outcomes, efficiency and/or effectiveness are a barrier to eHealth adoption (Dehzad et al., 2014), it can be deduced that evidence is needed to decrease this lack. *Validated by evidence* is therefore included as a possible motivator. We suggest the following:

H3. When the eHealth application is *validated by evidence*, this is a motivator for adopting eHealth.

Drawing from literature and reasonable assumptions, we constructed a conceptual framework and suggested the propositions as mentioned before. that supported our data analysis, as shown in Figure 1.

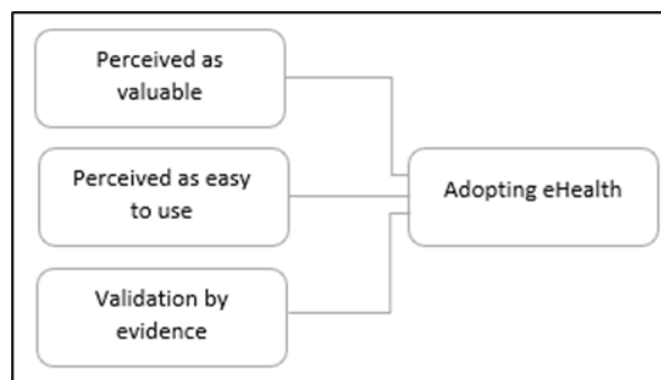


Figure 1: Conceptual framework

4. Method

Qualitative methods are used to collect data in this case study. We interviewed twelve professionals from three Dutch academic medical facilities using semi-structured in-depth interviews. These interviews consisted of open questions concerning motivators drawn from the literature and follow-up questions to allow the respondents to elaborate on their answers.

4.1 Data collection

We collected data from an eHealth application focussing on improving preoperative rehabilitation; this is called prehabilitation. The eHealth application is improving the physical preparation of patients on a waiting list for surgery. The project intends to decrease the number of complications after surgery through prehabilitation and improving information provision about lifestyle. The tips provided by the application by push-messages focus mainly on tasks to improve the patient’s physical condition and recovery. In addition, the application is also

linked to a platform of primary care physical therapists offering personal guidance. This eHealth application aims to improve all surgical procedures with a stressor big enough to cause a minimum of two days of hospitalisation.

4.2 Respondents selection

The respondents were selected based on their knowledge and experience in the healthcare branch, their experience with eHealth in general or their experience with the eHealth application we examined. The respondents have different backgrounds. Selected respondents with experience with the eHealth application of this case study are six physical therapists, one senior researcher and one oncology surgeon. Furthermore, we have included an interview with an eHealth implementation project leader and two innovation managers working in an academic hospital. For their general experience in healthcare, related to eHealth, we interviewed a head of anaesthesia and an internist & endocrinologist.

4.3 Data analysis

The interviews were recorded, transcribed and coded following a thematic coding approach. Documents were analysed according to the same thematic coding approach. As shown in the conceptual framework, three categories for expected motivators were the starting point for the analysis. We assigned codes to the transcripts and grouped these codes into categories, checking whether these codes fitted in the pre-defined categories. The pre-defined categories turned out not to be specific enough, leading to the development of new categories of drivers. These drivers are included in the theoretical framework if at least one-third of the respondents mentioned indicators as drivers. When at least one driver is identified for the motivator, the motivator is included in the theoretical framework we developed.

5. Results

As the conceptual framework includes three expected motivators, the results are presented following these three categories.

5.1 Perceived as valuable

Several indicators came forward when speaking about whether the perceived value of an application is a motivator for eHealth adoption. Several ways on how an eHealth application can add value are mentioned. It seems that this value does not necessarily have to be added value for the healthcare professional. Improving patient care, more self-management for the patient, decreased work pressure for the healthcare professional, improving their professionalism and innovating healthcare are mentioned when an application is perceived as valuable.

All respondents agreed they were more likely to accept an innovation when this application improves patientcare. Illustrative for this is the following quotation: *'In general, these professionals are intrinsically motivated to always provide the best possible care'*- vascular surgeon.

Tapping into the motivation to improve patient care is the strongest driver for this category.

Both the improvement of self-management of the patient as to when the application is perceived as innovative to healthcare are regarded as drivers for eHealth adoption as both are mentioned by 33%.

Improving their professionalism by using an eHealth application is another indicator mentioned, illustrated by this: *'Providing patient care is following the book, but it gets much more interesting when you get to write that book.'*- Internist. However, this is not included as a driver as only 16% of respondents named this indicator, it did not meet the threshold of one-third of respondents.

Decreasing work pressure for the healthcare professional is mentioned by one-third of the respondents.

If an eHealth application is perceived as valuable, this motivates the adoption of eHealth. The strongest driver for this motivator found is *improving patient care (100%)*. Other drivers we identified are: *improving self-management patient (33%)*, *decreasing work pressure (33%)* and *innovating healthcare (33%)*.

5.2 Perceived as easy to use

An important finding is that the application needs to be embedded in the process, with no extra process step required for the healthcare professional. Illustrative for this: *'You need to do whatever you can to let them do*

what they do best: meeting with patients and making decisions’.- Innovation manager. When looking at whether or not an application is perceived as easy to use, this seems to be the strongest indicator. As two-third of the respondents mention this, it is included as a driver to adopt.

User-friendliness is another indicator mentioned, but only a tiny fraction (25%) said this would be a driver to adopt. As this indicator did not reach one-third of the respondents’ threshold, it is not included as a driver for adopting eHealth. If healthcare professionals co-created the application, for some, 33%, this would be a reason to adopt.

In our case study, *perceived as easy to use* is a motivator to adopt eHealth. The strongest driver found is being *embedded in the process* (66%), also *made by healthcare professionals* (33%) is found to be a driver.

5.3 Validated by evidence

In each interview, one of the indicators of evidence as a motivator to adopt eHealth was reported. The following indicators whether or not an eHealth application needs to be *validated by evidence* first were mentioned: *result-oriented, critical thinkers, proof from peers, scientific basis needed*.

A *scientific basis needed* is named by two-third of the respondents as a driver to adopt. Moreover, it was stated that *‘first scientific evidence is needed in order to motivate healthcare professionals later’*- eHealth implementation manager. Additionally, the internist said that the healthcare professional usually adopts the change when science ‘agrees’. Also, 66% of the respondents mentioned that healthcare professionals are result-oriented. *Result-oriented* and *scientific basis needed* are therefore the strongest drivers found.

Some (16%) healthcare professionals mention that healthcare professionals are critical thinkers, which means they first need evidence of the value before adopting eHealth. However, this indicator did not meet the (one-third of the respondents) threshold and was therefore omitted. That proof does not always need to be scientific is seen in the indicator *proof from peers*. Half of the respondents have mentioned this.

As at least one driver is found, the motivator *validated by evidence* is found in the studied context. The strongest drivers to this motivator are result-oriented (66%) and the *scientific basis needed* (66%). Also, *proof from peers* (50%) is found to be a driver of motivation *validated by evidence*.

6. Discussion

This paper proposes a theoretical framework with motivators and drivers of healthcare professionals to adopt eHealth. *‘Perceived as valuable’*, as *‘easy to use’* and *‘validated by evidence’* are motivators to adopt eHealth by healthcare professionals. These motivations are specified in several found drivers, as shown in Figure 2.

This study supports the statement that being *perceived as easy to use* is a positive factor for eHealth adoption (Reychav et al., (2018). This motivator has been specified into drivers: *embedded in the process*, as the strongest driver mentioned by two-thirds of the respondents, and *made by healthcare professionals*. Dehzad et al. (2014) consider collaboration with end-users as a possible breakthrough for the barrier of working with eHealth ill-adapted to healthcare professionals. *Made by healthcare professionals* as a driver to adopting eHealth suggests that breaking through this barrier could improve eHealth adoption.

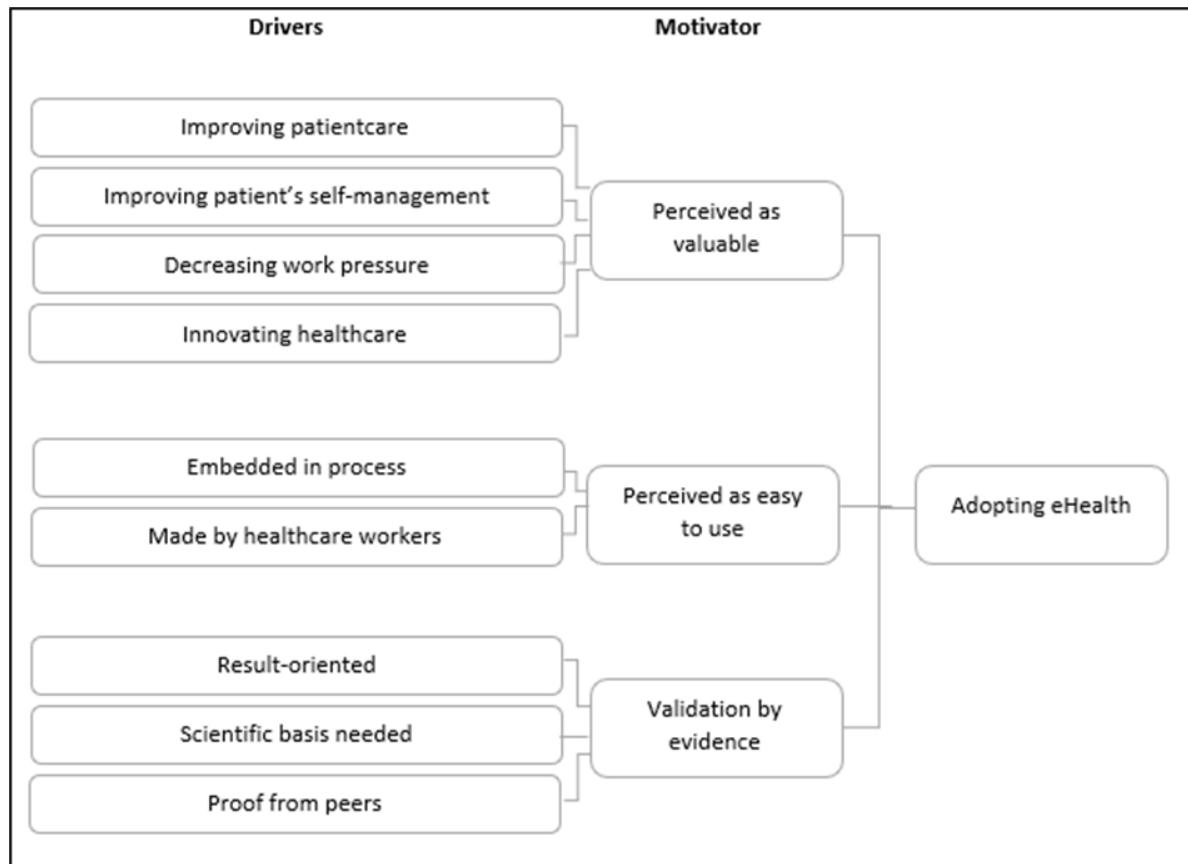


Figure 2: Theoretical framework of motivators and drivers of healthcare professionals to adopt eHealth

Remarkably, embedding the eHealth application in the healthcare provision process, i.e. no extra process-step or no drastic change of work habits is required, is a strong driver. This finding may suggest that embedding the eHealth application in the process is linked to work pressure. Even though several respondents mentioned the indicator of decreasing work pressure, this is not nearly as strong a driver as the eHealth application's embedding. It can be argued that not embedding an eHealth application would be a barrier. However, it can also be argued that embedding the application in the process is the same driver as decreasing work pressure, explaining that these drivers were not mentioned separately by the respondents. Further research is needed to ensure that *embedding in the process* is truly a motivational driver and not just an indicator of the absence of a barrier.

The third motivator is *validation by evidence*, specified in the following drivers: *result-oriented*, *scientific basis needed* and *proof from peers*. Kotter (2002) argues people adopt changes based on emotion rather than rational facts. However, this study shows that healthcare professionals prefer rational facts; evidence validation is an important motivation to adopt eHealth. Even the driver *improving patient care*, mentioned by every respondent, seems to have rational facts as a precondition. Found in this study is that rational facts presented as *proof from peers* is another important driver, this too *contradicts* Kotter's argument that people change based on emotion. Dehzad et al. (2014) state that healthcare is traditionally conservative due to risk-averse behaviour. This risk-averse behaviour could explain why validation by evidence is a motivator to adopting eHealth. Could it be that validation of evidence soothes the professionals mind?

Waneka & Spets (2010) described the positive influence of believing the patient would benefit. This turned out to be the strongest driver of this study. Improving patient care is a driver of the motivator *perceived as valuable*. Besides this, the drivers *improving self-management of the patient*, *decreasing work pressure* and *innovating healthcare* were found.

Moreover, the driver *improving self-management patient* can be seen as a specification of *improving patient care*, underlining its importance. These are drivers of when an application is *perceived as valuable*, thus becoming a motivator. Dehzad et al. (2014) have found that a conservative attitude amongst healthcare

professionals towards new technologies can be an impediment when implementing eHealth. A respondent in this research mentioned that healthcare professionals are usually reluctant to adopt change. The results of this study suggest that this barrier can be overcome by rational facts about the value of the application, proven to improve their working field or patient care. Illustratively, an innovation manager said, *'Even the most critic worker will adapt innovation when the patients benefit'*. However, the respondent added, *'this first needs to be proven'*.

What is more, it can be argued that these motivations can work as a *self-fulfilling prophecy*. When the healthcare professionals are inclined to work with an application that is perceived as easy to use, or/and as valuable, these professionals will experience its value. This will decrease the conservative attitude amongst healthcare professionals, decreasing a known barrier. Moreover, when professionals (co-)develop the application, this is a driver for others to use the app. The professionals who helped create the application might be more inclined to prove its value to other professionals. As this is an identified driver for others to adopt eHealth, this could spark the process repeatedly, thus accelerating the transformational process. Seemingly, it can be argued that the observation made by Nictiz (2018) that clarifying the value of an eHealth application could accelerate the process was correct.

The drivers and motivators suggest that healthcare professionals adopt eHealth with the primary goal to improve healthcare. When the motivator perceived as valuable is compared with the need to have proof and the nature of their work in mind, this may suggest that healthcare professionals, because of their responsibility to their patients, adopt eHealth when this is the right thing to do for their patients. As said by the respondents, *'it is never the right thing to change something when you are not sure it will work'* and *'the patients depend on you'*. When the innovation is perceived as valuable, easy to use and its value has been proven, healthcare professionals adopt eHealth.

7. Conclusion

It seems that healthcare professionals adopt eHealth based on rational facts rather than emotion. The proposed self-fulfilling prophecy could increase the adoption process, as healthcare professionals help create the applications and provide proof of their value and ease of use by acting as a promoter to others. We have found that the motivators *perceived as valuable*, *perceived as easy to use* and *validated by evidence* suggest that healthcare professionals adopt eHealth to improve healthcare. Healthcare management can use these insights on the motivators and drivers for adopting eHealth, to adjust their eHealth strategy and achieve more successful eHealth implementations. This will benefit the healthcare sector and society, as eHealth helps create a more resilient and effective healthcare sector. As this research has been conducted in academic research facilities, future research is needed to validate findings in other healthcare facilities, as these organisations do not necessarily have an innovation focus. Further research is also needed to ensure driver *embedded in the process* and the omitted driver *decreasing work pressure* aren't indicators of the same driver.

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