How to Tell Whether Patients Engage and Use a Patient Portal - An Analysis of Five Functions

Emil Aale HÆGERMARK[a,1], Julia NEMETH[b] and Arild FAXVAAG[a]

[a] *Department of Neuromedicine and Movement Science, Faculty of medicine and health sciences, Norwegian University of Science and Technology, Norway*

[b] *Helseplattformen a/s, Trondheim, Norway*

ORCiD ID: Emil Aale Hægermark https://orcid.org/0009-0000-5369-6150,
Arild Faxvaag: https://orcid.org/0000-0002-6510-7306

Abstract. Background: The road to a more sustainable healthcare system includes creating a digital interface to the healthcare system that patients can use to engage in their health problems while outside the consultation room. The aim of the study was to evaluate trends in the use of functions in a patient portal and assess which functions were most likely to contribute to sustainable healthcare. Study design: Open, uncontrolled retrospective analysis of citizens' use of the patient portal. Methods: Extraction and statistical analysis of log data. Results: Log analysis revealed that patients engaged with the patient portal to make appointments, fill out and submit questionnaires, send messages to their care provider, inspect their laboratory results, and view notes about themselves. The functions that displayed a significantly increasing trend were the number of appointments made, the number of messages sent, and the number of checked test results. Discussion: While portal engagement can reduce patient dependency on healthcare services, external factors also influence this outcome. Further research is needed to investigate which functions support healthcare sustainability and enhance patient empowerment, possibly through other study designs.

Keywords. Patient engagement. Patient portals. Patient-centered information systems. Benefit analysis.

1.   Introduction

With an ever-increasing strain on health systems, health policymakers need to make wise decisions in terms of providing the appropriate resources for healthcare services (1). To provide such services, there needs to be a willingness to provide resources for innovation that lead to sustainable healthcare [1]. One avenue to provide such care is to increase patient engagement, as this has been shown to improve health outcomes leading to a more sustainable and cost-effective healthcare service [2].

The development and implementation of patient portals is one path to increase patient engagement and empower patients [2]. Portals allow the patient to access their personal health records and are managed by the healthcare organization [3]. Depending on the functionalities of the portal, the patients may review doctor notes, review

---

[1] Corresponding Author: Emil Aale Hægermark; E-mail: echaeger@stud.ntnu.no.

medication, review lab results, message a clinician, schedule appointments, request prescriptions, participate in video consultations, etc. [3, 4].

To promote efficient resource management, it is crucial to identify which portal functions are most useful and promote their use [1, 5]. For instance, having a lot of functions that the patients rarely or never utilize, is unnecessarily expensive and does not support sustainable healthcare [4].

This study has followed the implementation of HelsaMi (MyHealth), a patient portal product that is owned by Epic System Corporation, a large, international EHR vendor and that was purchased and adapted for use by all healthcare providers in Central Norway [6]. HelsaMi aims to facilitate citizen involvement and enhance patient engagement by allowing users to check upcoming appointments, read their journals, and send messages to healthcare professionals [7]. HelsaMi is available as an application for smartphones and tablets, but it is also possible to access it through a web browser.

The aim of the study was to evaluate trends in the use of functions in a patient portal and assess which functions were most likely to contribute to sustainable healthcare.

2.   Materials and Methods

The study was designed as an open, uncontrolled retrospective study, using log data from the HelsaMi application [8,9]. Data was collected from the 1st of January until the 31st of December 2023. Ethical approval from REK or NSD for using log data was not needed as the data were anonymized. The analysis focused on trends in use of the following functions in the portal: Appointments made, questionnaires filled out and submitted, messages sent, test results checked, and notes viewed. Data were collected and analyzed using log data within the Epic interface, utilizing custom-built dashboards for data display [10]. User demographics, like age group and gender of the HelsaMi-users, are presented. Mean and standard deviation were calculated for the different functions based on their monthly values in 2023. The Mann-Kendall trend test was conducted to determine whether there were significant changes in the trends in 2023 with a p-value less than 0.05 considered significant.

3.   Results

3.1.   *User demographics*

By 31st of December 2023, a total of 197 646 inhabitants had a registered account in HelsaMi. 116,688 (59.0 %) of the users were female, while 80,958 (41.0 %) were male. The average age of the users was 46.4 years old (SD: 18.9 years old). The number of users in the following age groups 0-24, 25-44, 45-64, and 65 and older were 27,824, 70,290, 59,711, and 39,821, respectively. When considering both gender and age group, females in the age group 25-44 years old were the largest group with 45,225 users.

Table 1. User demographics

Category	n (%)
Total number of users	197646, (100)
Gender	
Females	116688 (59.0)
Males	80958, (41.0)
Age groups	
0-24 years old	27824, (14.1)
25-44 years old	70290, (35.6)
45-64 years old	59711, (30.2)
65+ years old	39821, (20.1)

3.2. Patients' use of functions in the patient portal

The number of appointments made by the users through the patient portal was 14 925 in 2023. The monthly average was 1234.1 (SD: 1132.9). The Mann-Kendall trend test showed a statistically significant positive change in trend for 2023 with an increasing number of appointments made (p-value = 0.016, S = 36.0). Figure 1 shows the monthly values for 2023.

Figure 1. The number of appointments made per month.

The number of messages sent was 15 973 in 2023. The monthly average was 1328.1 (SD: 423.6). The Mann-Kendall trend test showed a statistically significant positive change in trend for the total number of messages sent (p-value = 0.011, S = 38.0). Figure 2 shows the monthly values for 2023.
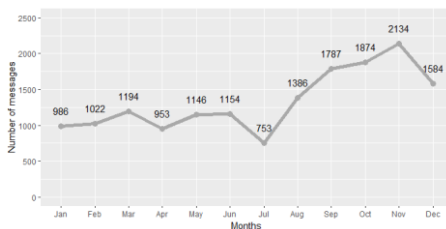
Figure 2. The number of messages sent per month.

The number of completed questionnaires was 132 284 in 2023. The monthly average was 11 023.7 (SD: 3250.2). The Mann-Kendall trend test showed a slightly, non-significant decreasing change in trend (p-value: = 0.95, S = -2.0).

The number of checked test results was 110 307 in 2023. The monthly average was 9192.3 (SD: 6393.6). The Mann-Kendall trend test showed a statistically significant

positive change in trend for the total number of messages sent (p-value = 0.0032, S: 44.0).

The number of notes viewed was 30 035 in 2023. The monthly was 2503.7 (SD: 608.1). The Mann-Kendall trend test showed a decreasing trend, but this was not significant (p-value = 0.30, S = -16.0).

4.   Discussion and Conclusions

In this investigation, we have shown that monitoring the use of functions in a patient portal can be used as a tool to assess the value of the service. The functions with significant increasing trends were the number of appointments made, the number of messages sent, and the number of checked test results. This could be interpreted as functions that were gradually more approved by patients as they got more familiar with the service. However, using the portal to fill out questionnaires like patient-reported outcomes in advance of consultations was the most utilized, possibly reflecting an increased awareness of how to use the portal to submit personal data from the start of implementation.

We would like to focus on assessing two of the functions and discuss their potential usefulness, as we believe the others either have been discussed in other papers or provide less interesting discussion points [5,11,12].

Regarding the number of appointments made through the portal by the patients, this number is quite low considering the total number of consultations performed at the hospital, meaning that most of the appointments were ordered by the healthcare providers themselves. This is not surprising because to access specialist healthcare in Norway, one needs a referral from a healthcare professional, i.e. from a doctor in another specialty, a general practitioner, or a physical therapist [13,14]. Consequently, there is a limited value for the whole population in having a service that lets you make appointments at the hospital. Henceforth, such a function is most useful for patients with chronic diseases who already are a part of a treatment program or patients who want to make an appointment with primary care. In other words, one does not get the value from this function in a patient portal unless the healthcare service has a compatible architecture.

Furthermore, messaging a healthcare professional through the portal has several advantages because the messages are sent through a secure service and the function provides a channel for rapid communication and clarification of medical issues [15]. Third, solving cases through messages will result in no need to make an appointment and could be time-saving for both the patient and the healthcare provider [15]. However, offering such a messaging service raises some issues as studies have shown that it lowers the threshold for contacting healthcare services and unnecessary contacts, leading to over-utilization of healthcare [16]. In addition, there needs to be developed a framework for the rates by using messages to solve medical issues [16].

Consequently, while engaging patients through a patient portal could reduce the dependency on healthcare services, there is no guarantee that the healthcare service has the architecture necessary to support the portal most optimally or that the patient might lower his/her threshold to contact the healthcare service. Further research is needed to investigate which functions support healthcare sustainability and improve patient empowerment, for instance by conducting qualitative studies interviewing both patients and healthcare providers as well as quantitative studies evaluating the time each healthcare provider spends with the patients with and without a patient portal.

References

[1] Kelly CJ, Young AJ. Promoting innovation in healthcare. Future Healthc J. 2017;4(2):121-5.

[2] Irizarry T, DeVito Dabbs A, Curran CR. Patient Portals and Patient Engagement: A State of the Science Review. J Med Internet Res. 2015;17(6):e148.

[3] Beal LL, Kolman JM, Jones SL, Khleif A, Menser T. Quantifying Patient Portal Use: Systematic Review of Utilization Metrics. J Med Internet Res. 2021;23(2):e23493.

[4] Nøst TH, Faxvaag A, Steinsbekk A. Participants' views and experiences from setting up a shared patient portal for primary and specialist health services- a qualitative study. BMC Health Services Research. 2021;21(1):171.

[5] Gleason KT, Powell DS, Wec A, Zou X, Gamper MJ, Peereboom D, Wolff JL. Patient portal interventions: a scoping review of functionality, automation used, and therapeutic elements of patient portal interventions. JAMIA Open. 2023;6(3):ooad077.

[6] Helseplattformen. Spørsmål og svar 2023 [Available from: https://www.helseplattformen.no/om-oss/generelt-sporsmal-og-svar/#hvem-er-leverandorene.

[7] Helseplattformen. Hva er HelsaMi 2022 [Available from: https://www.helseplattformen.no/om-oss/generelt-sporsmal-og-svar/#hvem-er-leverandorene.

[8] Nair B. Clinical Trial Designs. Indian Dermatol Online J. 2019;10(2):193-201.

[9] Huerta T, Fareed N, Hefner JL, Sieck CJ, Swoboda C, Taylor R, McAlearney AS. Patient Engagement as Measured by Inpatient Portal Use: Methodology for Log File Analysis. J Med Internet Res. 2019;21(3):e10957.

[10] Chishtie J, Sapiro N, Wiebe N, Rabatach L, Lorenzetti D, Leung AA, et al. Use of Epic Electronic Health Record System for Health Care Research: Scoping Review. J Med Internet Res. 2023;25:e51003.

[11] Dendere R, Slade C, Burton-Jones A, Sullivan C, Staib A, Janda M. Patient Portals Facilitating Engagement With Inpatient Electronic Medical Records: A Systematic Review. J Med Internet Res. 2019;21(4):e12779.

[12] Petrovskaya O, Karpman A, Schilling J, Singh S, Wegren L, Caine V, et al. Patient and Health Care Provider Perspectives on Patient Access to Test Results via Web Portals: Scoping Review. J Med Internet Res. 2023;25:e43765.

[13] Helsedirektoratet. § 2-1b Rett til nødvendig helsehjelp fra spesialisthelsetjenesten 2024 [Available from: https://www.helsedirektoratet.no/rundskriv/pasient-og-brukerrettighetsloven-med-kommentarer/rett-til-helse-og-omsorgstjenester-og-transport#rett-til-nodvendig-helsehjelp-fra-spesialisthelsetjenesten.

[14] Ekanayake S, Ward AE, Heart D, Valery P, Soar J. Improving primary care referral to specialist services: a protocol for a 10-year global systematic review in the Australian context. BMJ Open. 2023;13(8):e068927.

[15] Chivela FL, Burch AE, Asagbra O. An Assessment of Patient Portal Messaging Use by Patients With Multiple Chronic Conditions Living in Rural Communities: Retrospective Analysis. J Med Internet Res. 2023;25:e44399.

[16] Sieck CJ, Hefner JL, Schnierle J, Florian H, Agarwal A, Rundell K, McAlearney AS. The Rules of Engagement: Perspectives on Secure Messaging From Experienced Ambulatory Patient Portal Users. JMIR Med Inform. 2017;5(3):e13.