# eHealth for all? Towards usable and effective ehealth services in different health care settings

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# General discussion

The health care landscape, especially in primary care, demands a transformation in response to several factors, such as the increasing complexity of medical needs and a growing aging population. This transformation is essential for upholding the delivery of high-quality health care that remains accessible to all. eHealth presents opportunities for improving the accessibility of health care services by empowering individuals to manage their health through self-management. The overarching goal of this thesis was to examine whether different online services that provide direct access to care are usable and effective for patients and citizens. Different online services were investigated in different settings and with different users, with or without the involvement of health care professionals. Chapters 2 through 5 investigated the use and usability of direct access to different diagnostic test services. Chapter 2 presented a scientific overview of available online direct access to test and result services. Chapter 3 compared an online triage service with the decision-making process of general practitioners (GPs). Chapters 4 and 5 examined two different kinds of direct access to diagnostic tests and result services to investigate the use and usability of those online services. Lastly, Chapter 6 evaluated the effectiveness of an online self-management service, which was implemented in the daily practice of a pharmacy. With medication dispensing data, the effectiveness of medication adherence as well as exacerbation rates were evaluated.

## Main findings

The services explored in this thesis were found to demonstrate positive outcomes for direct access to care services in different settings. Overall, usage rates were high, and the patients or citizens who utilized the services were satisfied. However, it remains crucial to ensure that online services align with the needs of the target population for their effective utilization [1]. For most studies in this thesis, a preference was found among younger populations for using online services, rather than among older populations. The following paragraphs summarize the main findings for each chapter.

Chapter 2 systematically assessed the availability and usage of direct online access to diagnostic tests and result services. Specifically, the study focused on direct access for patients to (a) web-based triage that leads to diagnostic testing, (b) self-sampling or testing options, and/or (c) test results. The results indicated that the online services were highly used and that follow-up rates were high, indicating that users who ordered diagnostic tests online and tested positive were adequately linked to treatment. In total, 31 different services were discussed in 45 research studies. Most of the services offered direct access to sexually transmitted infections (STIs) testing and were used by a younger population. The acceptability and usability of the diagnostic test services were high, and there was a preference for home-based testing instead of clinic-based testing. More research is required in the field of diagnostic testing services for diseases other than STIs.

The first part of direct access to diagnostic tests and result services is often triage. Chapter 3 compared an online triage tool for STI testing and GPs' decision-making process through a qualitative vignette study. The online triage tool had a higher adherence to guidelines, while GPs considered patient preferences. It could be stated that GPs had a more holistic view of their patient, while the online triage tool adhered strictly to guidelines. Further research on this topic could provide a deeper understanding of the validity of online triage tools. When an online triage tool works for a diagnostic test, it could probably be used to reduce GPs' work pressure, thereby increasing access to care [2]. To explain, online triage could efficiently sort patients based on the severity of their symptoms. Patients with less urgent issues could be directed to appropriate self-care or self-testing resources, while patients with more serious concerns could be prioritized for immediate attention. This could help GPs to focus their time and expertise on patients who need it the most.

Next, Chapter 4 evaluated the usability of an online platform through which citizens can order diagnostic tests independently of a health care professional. The online triage tool from Chapter 3 was part of this service. Citizens participated in focus groups where information about the usability of the service was gathered. The amount of information provided as well as the comprehension (inclusion of medical terms) and user friendliness of the online service were identified as key elements that influence the usability of the eHealth service. The study also examined the needs of citizens for such a service to assist us in understanding why individuals would choose or prefer the website over visiting a GP. Mainly the younger population would use a website like Directlab Online for ordering diagnostic tests, while the older participants would rather visit their GP to address their health-related questions.



Then, Chapter 5 introduced Homelab, an eHealth service that allows patients from affiliated GP practices to independently order diagnostic tests under the online guidance of their own GP. The service's use and usability were evaluated through a quantitative questionnaire, which was implemented after patients used the service. The service's usability was perceived as above average by patients of all age groups, but particularly among younger patients. The average usability score was higher in the younger age group than in the older age group. Gender differences did not appear to exist in the perceived usability of Homelab. Furthermore, Homelab was used the most during the COVID-19 lockdown. Additionally, patients expressed a desire to use Homelab again in the future and as a substitute for regular consultations. This indicates that a service like Homelab can contribute to more accessible and efficient health care by reducing consultations.

Lastly, Chapter 6 investigated the effect of a pharmacy-based eHealth service designed for asthma and COPD patients, namely SARA. Medication dispensing data were used in a pre–post study to obtain insights into the effects of the service. Outcomes were assessed one year before and one year after the use of SARA and compared between users and non-users. The study revealed that the online service

SARA had the potential to assist in the self-management of asthma and COPD patients, resulting in decreased exacerbation rates and improved inhaled medication adherence. Especially in chronic users of inhaled medication, an increase in medication adherence was visible compared with controls. SARA users were, in general, younger than the non-users; however, their mean age was approximately 60 years.

## Lessons learned

Based on the studies presented in this thesis and conversations with patients and health care professionals, some lessons were learned about the implementation of online services. They are described in the following paragraphs.

First, the (perceived) reliability of the online service is important. This lesson is derived from Chapter 4, which delved into Directlab Online and highlighted that the launch and implementation of an online service do not guarantee its usage or appreciation. For citizens to embrace an online service, it must be perceived as reliable and user-friendly as well as deliver tangible benefits that users can readily perceive. Furthermore, considering that Directlab Online operates as a website for citizens without direct involvement from health care professionals, it was difficult for citizens to trust the service as a reliable resource. To ensure that a service like Directlab Online works, the service's reliability should be clear to users. Thus, it is beneficial to let users know that health care professionals were involved in the service.

The second lesson is that the needs of users can differ from the wishes of other stakeholders, and it is crucial to discuss those differences. For example, in Chapter 4, GPs wanted to have very detailed medical information on the online service; however, in the focus groups, the users highlighted that most of the information was not particularly helpful and that the amount of difficult information was perceived as a barrier to using the service. According to the users, information about privacy and the benefits of the service compared with visiting a GP was lacking. Thus, it is critical to co-create services with all relevant stakeholders to make the online service usable and effective [3]. Ultimately, a balance between the wishes and needs of all stakeholders must be found [4].

The third lesson is that the service must be as easy as possible for all users – both patients and health care professionals. During conversations with GPs for Chapter 5, I encountered a barrier related to the navigation of a novel digital environment, a finding that aligns with previous research regarding GPs' attitudes and experiences with online services [5]. Consequently, GPs would rather not use Homelab. Future endeavors should consider accommodating diverse login procedures and assuring GPs that the online services will seamlessly integrate with their existing suite of applications and workflows [6]. In addition, these future endeavors should consider laws and regulations to ensure privacy and security. Moreover, training for GPs in how to use the online service could help to make it as easy as possible for them to use [6]. The usability of the service is also critical for enabling patients and citizens to use it, as derived

from Chapters 4 and 5. The service must be as easy as possible for patients to use. For example, as found in Chapter 4, many elements of the service could be improved to increase its usability, such as information provision and the use of difficult terms. Those factors influenced the use and usability of the service negatively and should be considered when developing an online service. Crucial aspects to consider are language, the amount of information, colors, and the general look and feel of the website. As discussed in the previous paragraph, co-creation could help to optimize the usability of the service during development.

Lastly, a good implementation of an online service takes time, as seen in the Homelab study in Chapter 5. In the first months of Homelab's implementation, the service was barely used. It took time for patients to find the service and use it. For developers, project managers, and health care professionals, it remains important to be patient and to let patients get used to the service. It could be beneficial to help patients navigate through the service or provide leaflets with information about it.

## Implications



In general, as highlighted in the introduction and discussion chapters of this thesis, a need exists for increased accessibility to health care. The online services examined in this thesis could contribute to more efficient work processes, and they also increased the role of the patient through self-management, which demonstrates their potential. The online services exhibited the potential to improve the management of relatively uncomplicated cases, such as STI testing, through using online triage, ordering tests online, and receiving results online. This innovative approach can optimize the allocation of GPs' time resources, allowing them to dedicate a greater proportion of their efforts to the provision of care for more complex medical conditions and patients. However, it is imperative to acknowledge that while this perspective presents a promising vision for the future of health care delivery, the efficacy and safety of such services necessitate rigorous validation through comprehensive research endeavors. Further investigation is warranted to ascertain the feasibility, reliability, and overall impact of these online services on patient outcomes and health care utilization.

The online triage tool (Chapter 3), used in two of the services examined in this thesis, presented advice based on input from the patient, and the service was then able to present medical advice based on medical guidelines. It would be interesting to also consider the patient's medical history in the online triage tool (eg, medication use). Thus, the online tool could be more personalized for every patient and provide better advice on what kind of care is necessary for a specific patient. In addition, for every online service discussed in this thesis, it could be beneficial to make them more personalized. For example, for SARA, it would be a valuable enhancement if the intervention had input about the user's medication usage and any other relevant medication conditions. If this additional medical information was input into the service, SARA could offer more comprehensive information and guidance to the patient and health care professional concerning their medication regimen and overall health situation.

An interesting finding derived from Chapter 4 is that participants expressed a preference for the involvement of a health care professional in the process of ordering diagnostic tests, as this heightened the perceived level of reliability in the service. Noteworthily, the health care professional does not necessarily have to be their own GP, as citizens highlighted during the focus groups. In the Netherlands, every citizen currently has a specific GP, and sometimes their GP is unable to accommodate them due to a lack of available appointment slots. From the focus groups, the observation that a patient does not necessarily want to visit his or her own GP suggests that patients could be redistributed among various GPs, potentially alleviating the workload in specific geographic areas. The ability to distribute care is desirable because some regions of the Netherlands do not have enough health care professionals [7]. Moreover, the finding of patients' preference to not necessarily want to consult their own GP underscores a receptiveness among citizens to transformative shifts within health care. Specifically, it implies a readiness for potential changes in the role of the GP in the coming years.

In the study in Chapter 5, dialogues were conducted with GPs concerning Homelab. They revealed that the GPs exhibited a profound sense of responsibility for all online interactions with their patients. They underscored the enduring nature of their responsibility for their patients' well-being. Consequently, Homelab could offer significant advantages if GPs were granted the capability to review the outcomes of online triage and not only the advice of the triage (response of the patient for each question), thereby enabling them to assess patients' responses to specific questions. This potential feature could potentially enhance GPs' sense of control over patient care and facilitate a more nuanced understanding of patients' specific health complaints.

Here, I wish to emphasize that eHealth is not the solution for all health care challenges, nor should it be regarded as the holy grail. Nevertheless, enormous potential exists for favorable outcomes if health care professionals embrace online services. Noteworthily, the development and implementation of robust online services require a significant investment of time and resources, as corroborated by the findings in Chapter 5 and by other relevant research on the implementation of eHealth [8]. As delineated in Chapter 5, the initial months following the introduction of Homelab witnessed a limited uptake, with a scarcity of test packages being ordered. However, as Homelab became a more integral component of health care provision over time, its utilization steadily increased. The assimilation of Homelab into routine health care practices provides an opportune avenue for investigating its cost-effectiveness. A similar rationale holds for the online intervention SARA.

The effectiveness of SARA was researched in Chapter 6. SARA appeared to be a potentially effective method for increasing medication adherence in asthma and COPD patients through online self-management. The self-management intervention could be expanded to other chronic diseases to reduce the disease burden by increasing medication adherence. Non-adherence to medication in chronically ill patients is

a common problem, not only in asthma and COPD patients [9]. If a self-management intervention like SARA could assist in increasing adherence, it could reduce the disease burden and possibly also the work pressure in health care.

In this thesis, it appeared that all of the examined online services were used more by younger participants, and the usability was also better perceived by the younger population (Chapters 2, 4, 5, and 6), which is in line with earlier research about eHealth services [10-12]. One could posit that online services are more aligned with the requirements and/or proficiencies of a younger demographic, which suggests that online services may not be universally applicable. However, it is imperative to underscore several key considerations in this context. First, Chapters 2, 4, and 5 involved services where STI testing is mostly used. Since STIs mainly occur in people below the age of 30 years, it is logical that younger patients would appreciate such online services more than a population with higher age [13]. Second, although the online services were more highly appreciated by the younger population, some services were also used by a relatively higher age group. For example, for Homelab, the mean age was approximately 40 years. The usability was scored lower among patients in the higher age group than in the below-40 age group, but both groups reported good usability [14]. Third, the mean age of the population in SARA was approximately 60 years, which was comparatively higher than the mean age in the other studies of this thesis. Nevertheless, the mean age of 60 years aligns well with the COPD population that SARA was made for [15], but it was found to be effective. In line with this finding, similar findings were found for another online service with videos explaining the most essential information from package leaflets for medication [16]. Specifically, two-thirds of the population were aged above 55 years [16]. Here as well, the research demonstrated that the younger population experienced more valuable additions (eg, saw the benefit) to the website than the population with a higher age. However, all users of the website were positive in general [16]. Some studies found that, especially in an older population, the online service had more of an effect than in the youngest population [17]. With the increasing technological competence of the elderly, eHealth could become more suitable for all [18]. In addition, tailored and more personalized online services could improve their accessibility [19]. Research findings have indicated that co-creation can increase effectiveness and contribute positively to implementation [18, 20]. Concretely, this means that there must be even more co-creation with a more diverse group of users to increase the accessibility and use of online services. Only then can online services provide a potential strategy for changing the general accessibility of health care.

Furthermore, while primary health care is lagging in digitization, we still observed a significant reliance on non-digital equipment, including administrative tasks [21]. While some general practices have embraced online operations or established effective means of digital communication through scientifically validated eHealth solutions, these instances remain exceptions rather than the norm. Health care professionals in

primary care are facing multiple related issues, such as a lack of time and resources [22]. Scientifically validating online services could play a crucial role in identifying both benefits and obstacles to the responsible expansion of online services in health care. Identifying benefits and obstacles is essential for ensuring that these services not only work effectively in practice but also integrate seamlessly into the daily routines of health care professionals, addressing any associated barriers [23]. As mentioned earlier, scientific validation is needed to guarantee that these services align with the needs of health care professionals and serve as practical tools for enhancing patient care.

## Strengths and limitations

A notable strength of this thesis is that all of the studies pertained to online services that were implemented or subjected to pilot programs in authentic real-world settings, within the realm of daily practice. None of them were in experimental environments or specific populations. Notably, the generalizability of real-world studies is higher than that of randomized controlled trials (RCTs) [24]. In addition, this thesis underscores the importance of consistently considering the requirements, inclinations, and facilitators that enable users to effectively engage with online services. By doing so, these services could benefit both patients and health care professionals, ensuring that the right assistance for the GP is provided in the appropriate manner.

A general limitation of online service research lies in the duration required for research and implementation as well as the pace of innovation. The studies presented in this thesis were conducted between 2020 and 2023. However, the rapid pace of development of Internet-related technologies – and thus of online services – poses a challenge in maintaining pace with the day-to-day tools used by patients [25]. This limitation changed, for example, the relevance of one of our studies; specifically, during the comparison between an online triage tool and the decision-making process of a GP, it became evident that an artificial intelligence chatbot could serve as an effective machine for answering health-related questions [26]. Highlighting the difficulty of aligning scientific research with the constantly evolving technologies used by patients, a significant concern was that the tools under investigation could already have been outdated by the time the research concluded. Especially for online services, it could be beneficial to deviate from the golden standard of RCTs to validate new services and research their effectiveness [27]. RCTs require a significant amount of time and money. As previously stated, time is not always available in the quickly changing digital world [25]. For online services, RCTs do not often fit with the large group of different kinds of users whom one would want to include to use one's service; in other words, the external validity of RCTs does not fit with that for online services [28]. Online services are used in a real-life environment where confounding factors cannot be anticipated [29]. Other methods for scientifically analyzing online services can be recommended depending on the research goal [30]. Differences can be made in different phases

– namely conceptual, design and usability, implementation, effectiveness, and feasibility. Specifically, a feasibility study (used to estimate critical parameters required for the main study) would not evaluate the service, while an interrupted time-series design would evaluate the service over a longer period [30]. For example, the vignette study in this thesis (Chapter 3) was used to provide valuable insights into how health care professionals would respond to a specific situation or scenario where conducting this type of research in a real-life setting was not feasible. By presenting participants with the same scenarios (eg, complaints, sexual history, and age), we attempted to minimize variations between scenarios and ensure that each general practitioner encountered the same patients [30-32].

Another limitation was that most of the research for this thesis was performed during the COVID-19 pandemic. A consequence of the COVID-19 lockdown period was that most interviews and focus groups had to be performed online. However, with good preparation, the right number of participants, and a highly usable platform, online interviews and focus groups can be a strong option [33].



## Future research

As discussed in the introduction chapter, online services could end up in the metaphorical Valley of Death. In this thesis, the online services were implemented in real-life settings. Investigating online services in real-life settings could be instrumental for avoiding the Valley of Death phenomenon, since they are not solely studied in controlled research environments [34, 35]. However, other factors (eg, how often services are used and if they are cost-effective) are also crucial for, among others, health insurance companies and policymakers [36, 37]. Understanding costs is vital for health insurers to provide cost-effective coverage to their policyholders and make informed decisions about service inclusion and reimbursement rates. More research is required to investigate whether online services are cost-effective, as cost-effective online services would be less likely to end up in the Valley of Death.

An online triage service plays a significant role in online services such as Directlab Online and Homelab. Ensuring the effectiveness of the triage tool is of paramount importance. While this thesis addressed certain aspects related to the triage tool, it would be intriguing to explore how users perceive its language and understandability. Certain (medical) words or phrases used in the online triage tool may prove difficult or confusing for users [38]. In such cases, users might misinterpret the tool's recommendations, leading to inaccurate or insufficient advice. By delving into the user experience and ensuring the clarity and comprehension of the online triage tool, its accuracy and effectiveness could be enhanced, ultimately benefiting users and improving the overall performance of the online services. Research should investigate whether the holistic view of the GP can be integrated into an online triage tool by adding questions about the patient's background and medical history.

The goal of these services is to increase the self-management of citizens and patients; however, this thesis did not examine whether the services improve self-management. Addressing whether the online services Directlab Online and Homelab could effectively contribute to the self-management of users' health could be crucial. Researching self-management can be achieved by tracking the progress of patients or citizens who have ordered diagnostic tests through these services. The effect on self-management can be researched through self-management questionnaires. In addition, it could be interesting to examine changes in patients or citizens' health and assess the role of the services in facilitating such changes. Furthermore, it is important to consider the potential time-saving benefits of Homelab for GPs. Investigating whether Homelab leads to a reduction in consultations and saves valuable GP time is another direction for future research. Furthermore, users of Directlab Online should be followed over a longer period to answer the following questions: Are they changing their behavior as a result of the diagnostic test that they ordered? Are they ordering more diagnostic tests? Do they feel more in control? In addition, for SARA users, the following question could be examined: Are they feeling more in control, and did it change their quality of life?

Another interesting topic for future research could be pharmacists' perspective on SARA. SARA has been demonstrated to have the potential to be effective in patients with asthma and COPD. However, to ensure its effective functioning, it is equally crucial to gather feedback from pharmacists who use the service in their professional practice. Research about pharmacists' perspective on SARA could be performed qualitatively by interviewing them and quantitatively by measuring how much time they spend on SARA and how much they would normally spend on a patient. SARA can be expanded for use for more chronic diseases, but more research about those perspectives would be necessary. In addition, more research could be performed on patients' quality of life.

## Conclusions

We researched different online services designed for citizens, healthy GP patients, and chronic disease patients. The online services could not only help in the self-management of those populations but also lead to more accessible health care. We are able to conclude that the suitability of the researched eHealth services is not yet for all. They tend to be more favorably received and used by younger patients or citizens. Nevertheless, in general, patients and citizens tend to be open and positive regarding the use of online services, frequently finding the usability of the services to be satisfactory. With ongoing collaboration among all stakeholders and an improved understanding of technology and the Internet, eHealth services hold the potential to become more inclusive.

Notably, health care professionals have a critical role in shaping the quality of these online services and increasing their reliability through their involvement. In addition, a health care professional possesses a unique ability to approach patients, reason, and decide holistically – a perspective that is not (yet) fully integrated into online services.

However, patients and citizens exhibit positivity and receptiveness toward direct online access to care across different settings, which can offer considerable value. Yet, for these services to truly enhance self-management and health care's accessibility, it is imperative to maintain ongoing user engagement, including by actively addressing user needs and preferences. This proactive approach will ensure that eHealth services are optimized in terms of their usability, effectiveness, and overall contribution to the realm of self-management and accessible health care.

## References


1. Kasteleyn MJ, Versluis A, van Peet P, Kirk UB, van Dalfsen J, Meijer E, et al. SERIES: eHealth in primary care. Part 5: A critical appraisal of five widely used eHealth applications for primary care – opportunities and challenges. European Journal of General Practice. 2021 2021/01/01;27(1):248-56. doi: 10.1080/13814788.2021.1962845.
2. Pairon A, Philips H, Verhoeven V. A scoping review on the use and usefulness of online symptom checkers and triage systems: How to proceed? Frontiers in Medicine. 2023;9:1040926.
3. Carey M, Noble N, Mansfield E, Waller A, Henskens F, Sanson-Fisher R. The role of eHealth in optimizing preventive care in the primary care setting. Journal of medical internet research. 2015;17(5):e3817.
4. Botti A, Monda A. Sustainable value co-creation and digital health: The case of trentino eHealth ecosystem. Sustainability. 2020;12(13):5263.
5. Keuper J, Meurs M., Victoor A., Huygens M., de Groot J., de Jong J.,. De inzet van e-health-toepassingen in de huisartsenzorg: Leren van de succesverhalen uit de praktijk. https://www.nivel.nl/sites/default/files/bestanden/1003619.pdf: NIVEL, 2020.
6. Ross J, Stevenson F, Lau R, Murray E. Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). Implementation Science. 2016;11(1):146.
7. Flinterman L, Groenewegen P, Verheij R. Zorglandschap en zorggebruik in een veranderende eerste lijn. 2018.
8. Smit F, Lokkerbol J, Riper H, Majo MC, Boon B, Blankers M. Modeling the Cost-Effectiveness of Health Care Systems for Alcohol Use Disorders: How Implementation of eHealth Interventions Improves Cost-Effectiveness. J Med Internet Res. 2011 2011/08/11;13(3):e56. doi: 10.2196/jmir.1694.
9. Klok T, Sulkers E, Kaptein A, Duiverman E, Brand P. Therapietrouw bij chronisch zieken. Patiëntgerichte benadering noodzakelijk. Ned Tijdschr Geneeskd. 2009;153:A420.
10. Tossaint-Schoenmakers R, Kasteleyn M, Goedhart A, Versluis A, Talboom-Kamp E. The Impact of Patient Characteristics on Their Attitudes Toward an Online Patient Portal for Communicating Laboratory Test Results: Real-World Study. JMIR Form Res. 2021 2021/12/17;5(12):e25498. doi: 10.2196/25498.
11. Reiners F, Sturm J, Bouw LJW, Wouters EJM. Sociodemographic Factors Influencing the Use of eHealth in People with Chronic Diseases. Int J Environ Res Public Health. 2019;16(4):645. PMID: doi:10.3390/ijerph16040645.
12. Halwas N, Griebel L, Huebner J. eHealth literacy, Internet and eHealth service usage: a survey among cancer patients and their relatives. Journal of Cancer Research and Clinical Oncology. 2017 2017/11/01;143(11):2291-9. doi: 10.1007/s00432-017-2475-6.
13. Zorg V. SOA: Leeftijd & Geslacht. 2017 [cited 2023 2023-04-24]; Available from: https://www.vzinfo.nl/soa/leeftijd-en-geslacht/algemeen.
14. Schnoor K, Versluis A, Chavannes NH, Talboom-Kamp EP. The Usability of Homelab, a Digital Self-service at a Dutch General Practice, for Diagnostic Tests: Pilot Study With a Questionnaire. JMIR Formative Research. 2023;7(1):e42151.
15. Boerdam A, Bevolkingstrends KK. Astma en COPD in beeld. Den Haag: Centraal Bureau voor de Statistiek. 2016.
16. van den Berg LN, Chavannes NH, Aardoom JJ. Using Animated Videos to Promote the Accessibility and Understandability of Package Leaflets: Retrospective Observational Study Evaluating the First Year of Implementation. J Med Internet Res. 2023 2023/5/4;25:e40914. doi: 10.2196/40914.
17. Spoelman WA, Bonten TN, de Waal MW, Drenthen T, Smeele IJ, Nielen MM, et al. Effect of an evidence-based website on healthcare usage: An interrupted time-series study. BMJ open. 2016;6(11):e013166.
18. Nijland N. Grounding eHealth: towards a holistic framework for sustainable eHealth technologies. 2011.

19. Van Gemert-Pijnen J, Peters O, Ossebaard HC. Improving ehealth: Eleven international publishing The Hague; 2013. ISBN: 9462360677.
20. van der Kleij RMJJ, Kasteleyn MJ, Meijer E, Bonten TN, Houwink EJF, Teichert M, et al. SERIES: eHealth in primary care. Part 1: Concepts, conditions and challenges. European Journal of General Practice. 2019 2019/10/02;25(4):179-89. doi: 10.1080/13814788.2019.1658190.
21. van Gemert-Pijnen L, Nieuwenhuis B. DIGITALISERING IN DE GEZONDHEIDSZORG NADER BESCHOUWD. 2022.
22. Versluis A, van Luenen S, Meijer E, Honkoop PJ, Pinnock H, Mohr DC, et al. SERIES: eHealth in primary care. Part 4: Addressing the challenges of implementation. European Journal of General Practice. 2020;26(1):140-5.
23. Ossebaard HC, De Bruijn A, van Gemert-Pijnen JE, Geertsma R. Risks related to the use of eHealth technologies: An exploratory study. 2013.
24. Blonde L, Khunti K, Harris SB, Meizinger C, Skolnik NS. Interpretation and Impact of Real-World Clinical Data for the Practicing Clinician. Adv Ther. 2018 Nov;35(11):1763-74. PMID: 30357570. doi: 10.1007/s12325-018-0805-y.
25. Baker TB, Gustafson DH, Shah D. How Can Research Keep Up With eHealth? Ten Strategies for Increasing the Timeliness and Usefulness of eHealth Research. J Med Internet Res. 2014 2014/02/19;16(2):e36. doi: 10.2196/jmir.2925.
26. Ayers JW, Poliak A, Dredze M, Leas EC, Zhu Z, Kelley JB, et al. Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum. JAMA Internal Medicine. 2023. doi: 10.1001/jamainternmed.2023.1838.
27. Kuiper S. KM, Breukink S., Dirksen C. Gerandomiseerde trial is niet altijd de heilige graal. Medisch Contact. 2023.
28. Ossebaard H, Duivenbode Jv, Krijgsman J. Evaluatie van eHealth technologie in de context van beleid. Diemen: Zorginstituut Nederland & Nictiz. 2017.
29. van Gemert-Pijnen JEWC, Nijland N, van Limburg M, Ossebaard HC, Kelders SM, Eysenbach G, et al. A Holistic Framework to Improve the Uptake and Impact of eHealth Technologies. J Med Internet Res. 2011 2011/12/13;13(4):e111. doi: 10.2196/jmir.1672.
30. Bonten TN, Rauwerdink A, Wyatt JC, Kasteleyn MJ, Witkamp L, Riper H, et al. Online Guide for Electronic Health Evaluation Approaches: Systematic Scoping Review and Concept Mapping Study. J Med Internet Res. 2020 2020/8/12;22(8):e17774. doi: 10.2196/17774.
31. Daemers DOA, van Limbeek EBM, Wijnen HAA, Nieuwenhuijze MJdV, Raymond G. Factors influencing the clinical decision making of midwives: a qualitative study. BMC Pregnancy and Childbirth. 2017;17(1):1-12. doi: 10.1186/s12884-017-1511-5.
32. Tremblay D, Turcotte A, Touati N, Poder TG, Kilpatrick K, Bilodeau K, et al. Development and use of research vignettes to collect qualitative data from healthcare professionals: A scoping review. BMJ open. 2022;12(1):e057095.
33. Willemsen RF, Aardoom JJ, Chavannes NH, Versluis A. Online synchronous focus group interviews: Practical considerations. Qualitative Research.0(0):14687941221110161. doi: 10.1177/14687941221110161.
34. Wessner CW. Driving innovations across the valley of death. Research-Technology Management. 2005;48(1):9-12.
35. Markham SK. Moving technologies from lab to market. Research-technology management. 2002;45(6):31-42.
36. Gentili A, Failla G, Melnyk A, Puleo V, Tanna GLD, Ricciardi W, et al. The cost-effectiveness of digital health interventions: A systematic review of the literature. Front Public Health. 2022;10:787135. PMID: 36033812. doi: 10.3389/fpubh.2022.787135.
37. Bergmo TS. How to measure costs and benefits of eHealth interventions: an overview of methods and frameworks. Journal of medical Internet research. 2015;17(11):e254.
38. Coleman C. Health Literacy and Clear Communication Best Practices for Telemedicine. Health Lit Res Pract. 2020 Nov 6;4(4):e224-e9. PMID: 33170288. doi: 10.3928/24748307-20200924-01.