

Human-centered integrated care pathways for co-creating a digital, user-centric health information solution

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Abstract

Purpose – A broader challenge of co-creating digital solutions with patients addresses the question how to apply an open-access digital platform with trusted digital health information as a measure to transform the way patients access and understand health information. It further addresses use this for adherence to treatment,

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risk minimization and quality of life throughout the integrated patient journey. The aim of this paper is to demonstrate the early steps in towards progress to co-creating the digital solution.

Design/methodology/approach – To coordinate the co-creation process, the authors established a multiphased plan to deep-dive into user needs and behaviors across patient journeys, to identify nuances and highlight important patterns in stakeholder and end-user segment at various stages in the patient's journey.

Findings – A set of tools was designed to serve as a human-centered compass throughout the lifecycle of the project. Those tools include shared objects; personas, user journeys, a set of performance indicators with related requirements – all those tools being consistently refined in ongoing co-creation workshops with members of the cross-functional stakeholder groups.

Originality/value – In this study, a multidisciplinary, public-private partnership looked at integrated digital tool to improve access, understanding and adherence to treatment for diverse groups of patients across all stages of their health journeys in a number of countries including European Union (EU) and United States of America (USA). As a result of this work, the authors attempt to increase the possibility that the improved availability and understanding of health information from trusted sources translates to higher levels of adherence to treatment, safer use of medication (pharmacovigilance), better health outcomes and quality of life integrated in the patient's journey.

Keywords Co-creation, End-users, Digital health, Human-centered design

Paper type Research paper

Purpose

The future of the healthcare systems relies on the capacity to provide integrated patient-centered services through multisectoral collaborations (Kaehne and Nies, 2021). These collaborations in health delivery and research include healthcare providers, medical developments and technologies, private and public institutions, universities, research centers, the pharmaceutical and other industries, patient organizations, and medicines regulators. Creating integrated care solutions requires each part to complete and complement the system as a whole; as too often the component parts are being seen and delivered in fragmented pieces that make up a stack.

To be effective, digital healthcare transformation must address not only the adoption of integrated care models but also broader, regional and global challenges along the way, such as health equity, health and digital literacy, health behaviors, adherence and access to and integration of and healthcare. Digital technologies can play an important role in this transformation, as they are key enablers for the provision of integrated care solutions and essential tools for empowering both patients and healthcare professionals (Chauvin and Rispel, 2016; Bird *et al.*, 2021).

Among the main challenges, adherence to treatment is recognized as a worldwide public health problem (Costa *et al.*, 2015). World health organization (WHO) reports that more than 50% of all medicines are prescribed, dispensed or sold inappropriately worldwide (World Health Organization, 2002), and Organisation for Economic Co-operation and Development (OECD) estimates that around 200,000 premature deaths annually in Europe relate to poor medication adherence (Organisation for Economic Co-operation and Development, 2018). Currently, medicinal product information in the patient information leaflets (PILs), attached to each packaging of medicines are the mandated, primary source of information for every patient (Poplas-Susić *et al.*, 2014; Raynor, 2018). This paper-based source comes with many shortcomings. Production and dissemination of new or revised information is both time-consuming and costly, and that information may not be up to date by the time the patient receives their medicine. Furthermore, information may not be understandable or relevant to the needs of many patients (Poplas-Susić *et al.*, 2014). This problem is only aggravated by aging, multimorbidity, and chronic diseases. Several studies have shown that the paper PILs often do not meet the needs of all patients since they are difficult to consult and comprehend due to an excessively lengthy and undersized text, coupled with the presence of many incomprehensible medical terms (Colledge *et al.*, 2008). Digital technologies offer new opportunities to personalize medicinal product information (Minutolo *et al.*, 2022). The COVID-19 pandemic has accelerated the uptake of digital health technologies and further illuminated the need for accessible health

information, transforming the integrated digital healthcare delivery from being viewed as a potential opportunity to becoming an immediate necessity. Digital tools can also enhance access, understanding and adherence, enabling better patient engagement and integration of care (Minutolo *et al.*, 2022; Car *et al.*, 2017; Talmor *et al.*, 2018).

To address some of the above challenges and the need for trusted digital health information across the life-course, Innovative Medicines Initiative (IMI) funded the project gravitate-health [1]. This coordinated public-private partnership is a cross-functional effort setting out to demonstrate how the use of an integrated, digital, user-centric health information solution could create measurable improvements in availability and understanding of health information from a set of trusted sources, starting with the medicinal product information, electronic health records (EHR) and medicinal compendiums. Through the public-private model committed to accelerating the adoption of connected health solutions at scale and direct patient engagement, the gravitate-health project aims to empower and equip Europeans with digital health information for active and improved personal health management and increase treatment adherence as part of the holistic and integrated global digital effort.

Co-creating a digital, user-centric health information solution with patients has been a central inspiration in addressing our main challenge described in this paper: how to apply an open-access digital platform and user-relevant services with trusted digital health information to transform the way patients access and understand health information, and how to use this to improve adherence to treatment, risk minimization and quality of life throughout the integrated patient journey. The specific aim of this paper is to demonstrate the early steps as progress in co-creating the digital solution, by developing a set of personas that illustrate important segments and time-points in a patient journey.

Methods

To deliver the co-creation process, we established a multi-phased plan to deep-dive into user needs and behaviors across patient journeys, to highlight important patterns and stakeholder and end-user segment nuances, and identify the stages in the patient's journey highlighting the addressable health needs.

Human-centered design

The term "human centered design" has evolved over time and originated in the fields of ergonomics, computer science and artificial intelligence and is described in the International standard ISO 9241–210 as "approach to systems design and development that aims to make interactive systems more useable by focusing on the use of the system and applying human factors/ergonomics and usability knowledge and techniques" (International Organization for Standardization, 2010).

Design thinking

The opportunity to focus on a Patient as a co-creator of digital health design solutions is well supported by methodologies such as design thinking that utilizes a human-centered approach. «As an approach, design thinking taps into capacities we all have but that are overlooked by more conventional problem-solving practices. Not only does it focus on creating products and services that are human centered, but the process itself is also deeply human. Design thinking relies on our ability to be intuitive, to recognize patterns, to construct ideas that have emotional meaning as well as being functional and to express ourselves in media other than words or symbols. Nobody wants to run an organization on feeling, intuition and inspiration, but an over-reliance on the rational and the analytical can be just as risky. Design thinking, the integrated approach at the core of the design process, provides a third way. The design thinking process is best thought of as a system of overlapping spaces rather than a sequence of orderly steps. There are three spaces to keep in mind: inspiration, ideation and implementation.» (Brown and Wyatt, 2010).

Our approach was using the human centered design ([International Organization for Standardization, 2010](#); [Hargraves, 2018](#); [Melles *et al.*, 2021](#)) and design thinking ([Stickdorn *et al.*, 2011](#); [Brown and Wyatt, 2010](#)) methodology, which are described in the text box below. We applied a mix of methodologies and approaches including qualitative and quantitative research, gathering needs with testing scenarios, engaging user advisory group (UAG) to guide the outcomes, facilitating feedback gathering sessions and co-creation workshops. We collected data through desk research, semi-structured interviews and Delphi study. These were gathered between January and April 2021, based on that we organized a design thinking workshop and involved stakeholders for feedback. The process was divided into 3 phases, which are shown in [Figure 1](#).

Phase 1 - establishing user advisory group (UAG)

As a response to the “Call for interest” placed the UAG at the heart of the project guiding activities from a user perspective and enabling mechanisms for meaningful patient and public involvement and input throughout the project. A group of 20 individuals (10 Patients/ Patient Representatives, 5 Citizens/Consumers, 5 Healthcare Professionals) got together to play a major role in identifying and understanding the key user needs of the digital solutions to be developed during the project and will contribute to validating the tools.

Phase 2 - interviews with patients to gather requirements and Delphi survey prioritization

From the very beginning, the project was designed to allow multisector stakeholders to work directly with patients to empathize and deeply understand their needs, goals and expectations. Those insights established the foundation of the further survey designed to refine and confirm the user need categories. Primary end-users (including both patients/ caregivers and healthcare professionals) were identified from UAG established in Phase 1 and via the consortium networks for qualitative interviews, to gain insights that would enable the design of the survey. This served as a basis for a two-round Delphi survey, which was conducted to prioritize needs and to achieve consensus on the most important opportunity areas in the six categories of key performance indicators (KPIs): access and use, understanding, user experience, patient compliance/adherence, two-way communication, and risk minimization. Patients volunteered to participate following a “call for Patients” done in Phase 1. In total, 30 primary end users (patients/caregivers) responded to the call, with 23

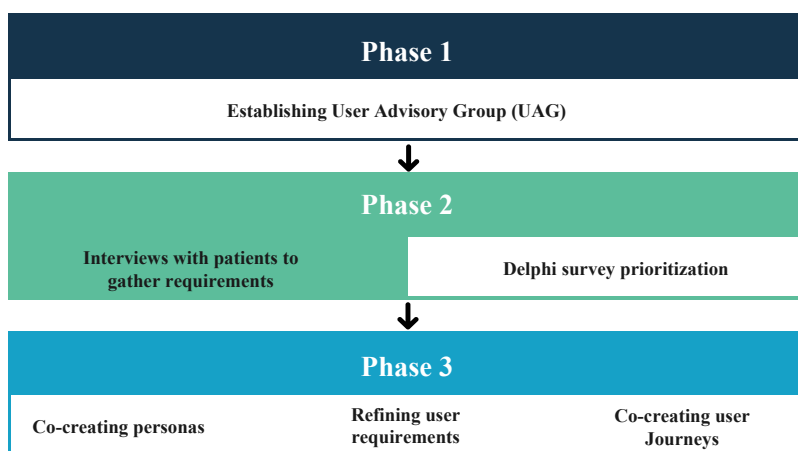


Figure 1.
Phases of the process

finally completing the survey. The interviews were framed and guided by statements co-created and validated by cross-functional project teams. They consisted of questions related to the patients' needs for focused, relevant, trusted information about medicine throughout the patient journey and their experiences interacting with healthcare, product information, available technology. Furthermore, it included questions about critical gaps in the ability to give or receive care that could potentially be addressed by the digital solution.

In addition to end-users, interviews were conducted with testing scenario owners, healthcare professionals and other stakeholder groups represented in the consortium. These stakeholder groups included pharma partners, SMEs, regulatory bodies, research institutes and universities, health policy advisors, and open-source communities with digital experience.

Phase 3 - Co-creating personas, refining user requirements and co-creating user journeys

The insights gathered from the interviews with the testing scenarios and the Delphi study were used to create a set of 6 primary user personas (see under Findings).

To aid our understanding of the patient's perspectives, we created diverse "testing scenarios" to allow us to zoom in on important "episodes" in a patient's life journeys, including self-care, periods of active treatment, and self-management. We also reviewed personas from different previous projects we had access to, such as CAPABLE [2] and EIP-AHA [3] addressing similar needs (varying demographics, health statuses, emotions, lifestyle, personality traits, education levels, life stage, home environment, health and digital literacy levels and behaviors) as additional input for persona development (Janson *et al.*, 2020; Vogt, 2021).

After initial version of personas was developed, a co-creation workshop was organized, where patients, cross-functional stakeholder groups, and designers came together to ideate and explore needs and requirements connected to the personas. We used these sessions to understand, define and map key factors in patient experiences, to discuss and ideate on how we could create a digital health information tool that would be meaningful and engaging for patients, enabling us to utilize their input and advice in order to develop human-centered user requirements. Then, further synthesis of the gathered material were shared in an in-depth reflection during the next session, ideas were conceptualized and visualized and brought back to the co-creation session for feedback. This cross-functional design thinking workshop allowed us to start connecting the touchpoints in the patient journeys and create an integration between the patient experience and the services that connect them with the people and activities that deliver them. This resulted in a holistic view of the key touchpoints that matter for patients using the digital tool. Patients' goals around access, understanding of information, and adherence were reflected in a guiding challenge statement for the workshop activity as part of developing the patient journey. This referred to co-creating a digital tool to transform the way patients access and understand health information, and apply this in their personal health for improved adherence to treatment, better health outcomes, and quality of life throughout the integrated patient journey.

Findings

A set of tools was designed to serve as a human-centered compass throughout the lifecycle of the project. Those tools include shared objects – 6 Personas, 6 user journeys, a set of KPIs with related requirements – all those tools being consistently iterated with members of the cross-functional stakeholder groups. These represent the different end-user activities for self-care, during active treatment and self-management and testing scenarios in the Gravitare-Health project.

All 6 personas are available at www.gravitarehealth.eu [4] and follow the same structure, namely: *Column 1*: About the Person, personality and interests and demographic data, *Column 2*: Health, including health conditions, medications and therapies, interaction with healthcare

providers and sharing of information, *Column 3*: Behavior, including health routines, pain points/problems and patient engagement level and finally *Column 4*: Environment, including illustration of autonomy, health and digital literacy level, support network and using of a personal health navigation tool (Figure 2).

The personas provided shared representations illustrating early functional requirements, consisting of recurring themes that required further consideration. The requirements expressed by the patients and the stakeholders also provided valuable insight into the potential challenges our digital solution may face during the project, i.e. interoperability, access to EHR, and the requirement to provide context-relevant information to go beyond what is already available to patients and health care professionals (HCP).

For the purpose of visualizing a persona, in this article, we present the persona (Maria) in Figure 3.

The personas allowed for meaningful deep dives into unique patient cases, based on real world examples in “self-care” “active treatment” and “self-management” activities. The wishlist of the features of the digital tool in the patients’ health journey and behavioral preferences across the key outcomes: access, understanding of information and adherence to treatment.

We then began to consolidate the data from the personas [4] to draft a representation of “patient journey” as the starting point allowing us to further evaluate and iterate on and test our assumptions with other stakeholders across Gravitate-Health to get feedback and seek further input.

Drawing upon the patient research and taking the real-live end-user personas as a guide, scenario-based patient journey maps were developed [4] detailing the key phases in a patient journey including self-care, active treatment and self-management. A patient journey map served as a blueprint of important touch-points a patient goes through in their care journey and created a way to visualize and get an overview of the patient experience as the patients’ progress along their health journey. Figure 4 shows the patient journey for the Maria persona.

Being based on real patient experiences, the wishlist of the digital tool features can be traced back to specific pain points along with the patient personas, their health journeys and behavioral preferences across the key outcomes: access, understanding of information and adherence to treatment.

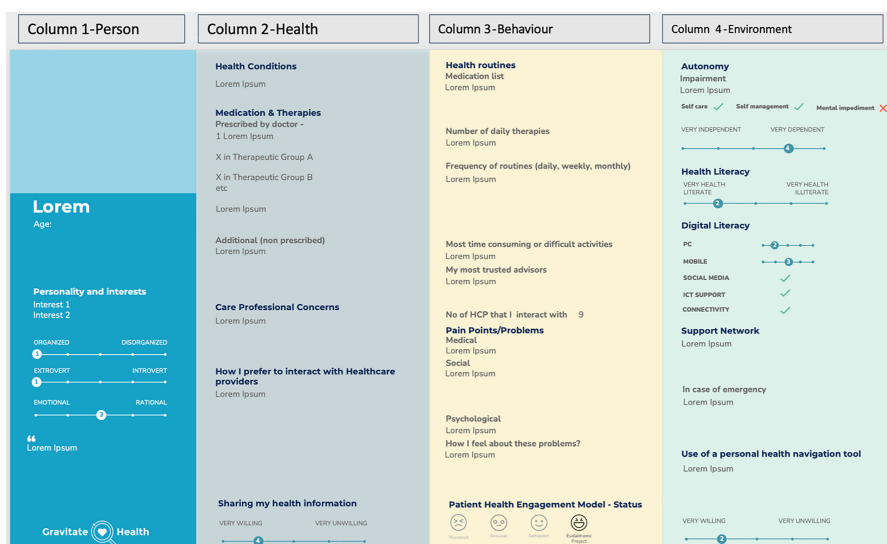


Figure 2.
Persona template

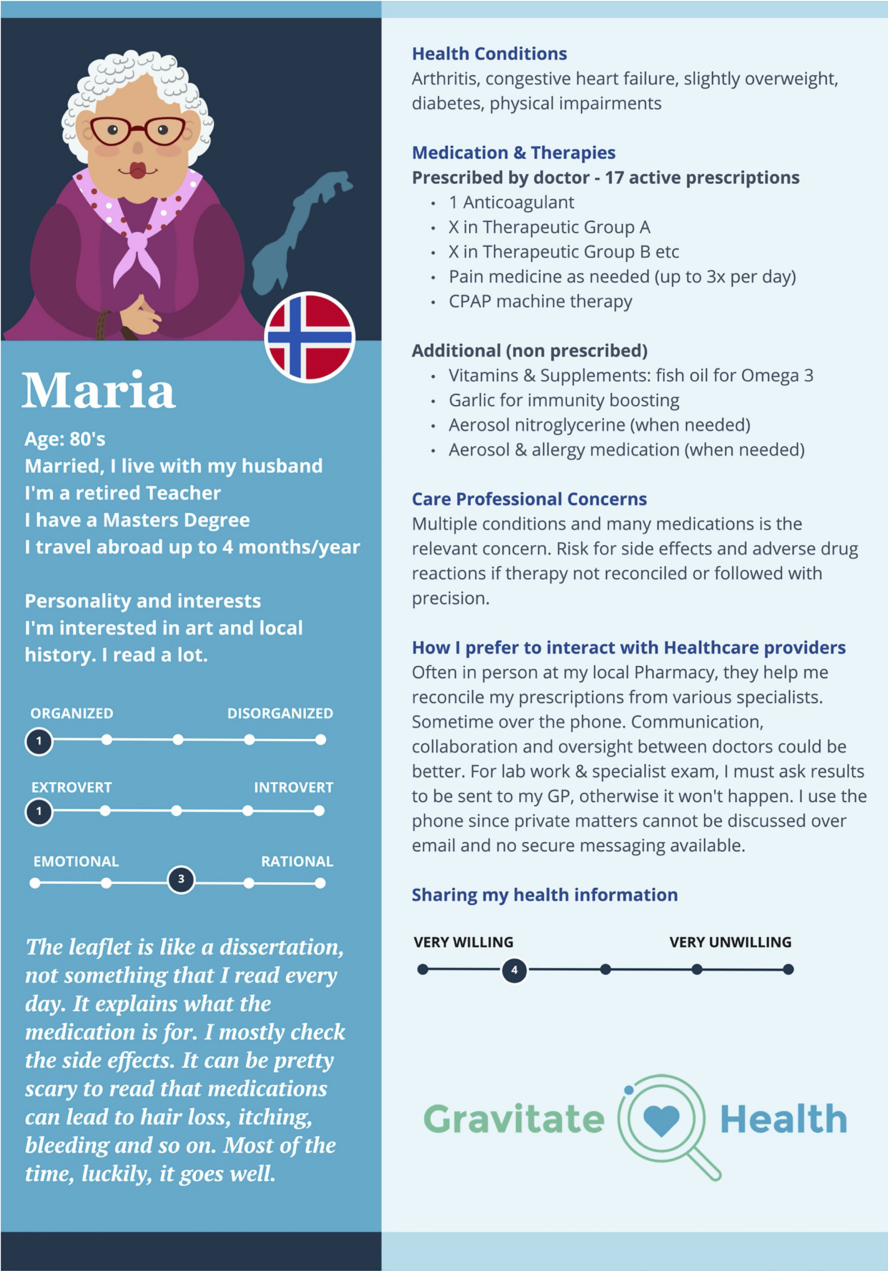


Figure 3.
Maria Persona

(continued)

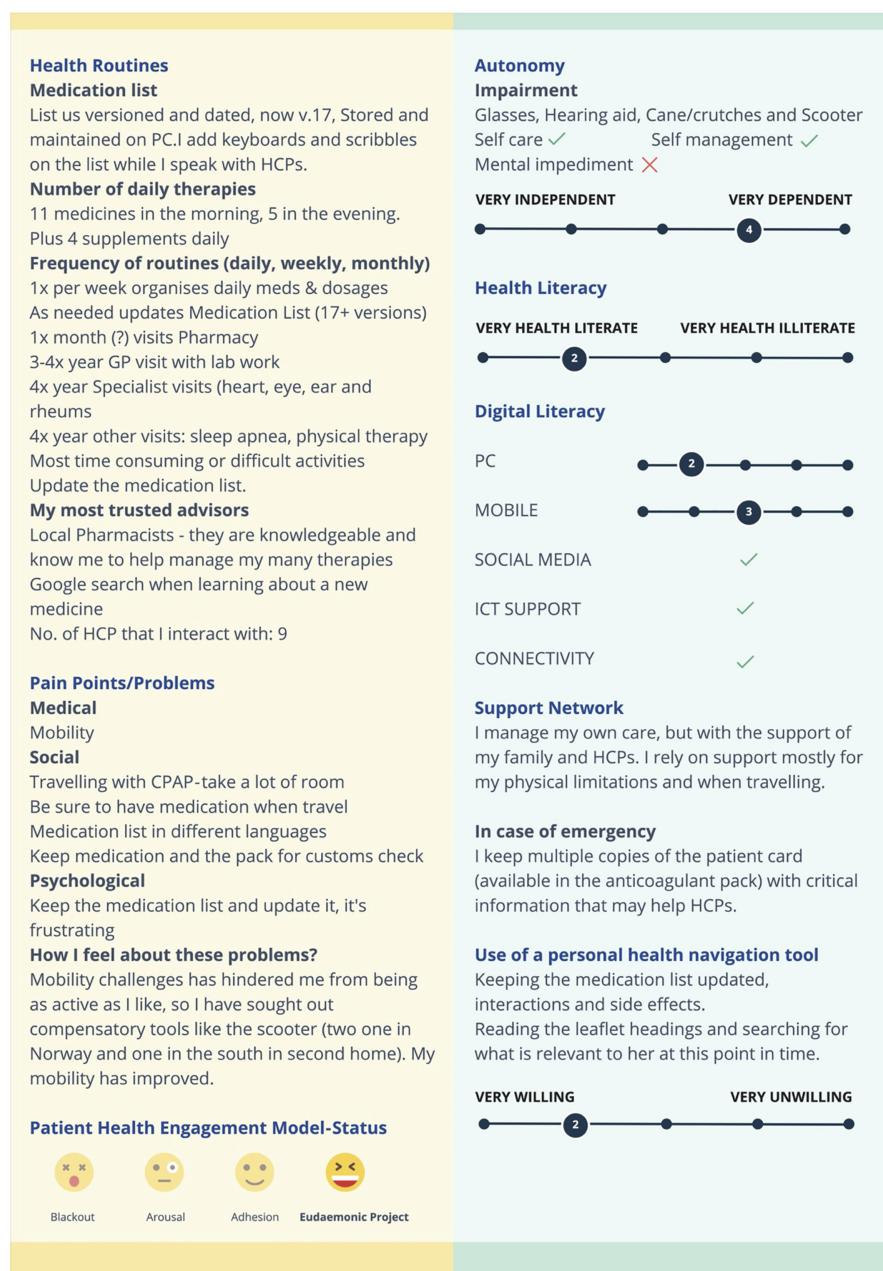


Figure 3.

Stakeholders and patients' involvement in the 3 phases provided valuable insights into all areas of the solution at the early stages and paved the way to create a practical and complete response to the challenge.

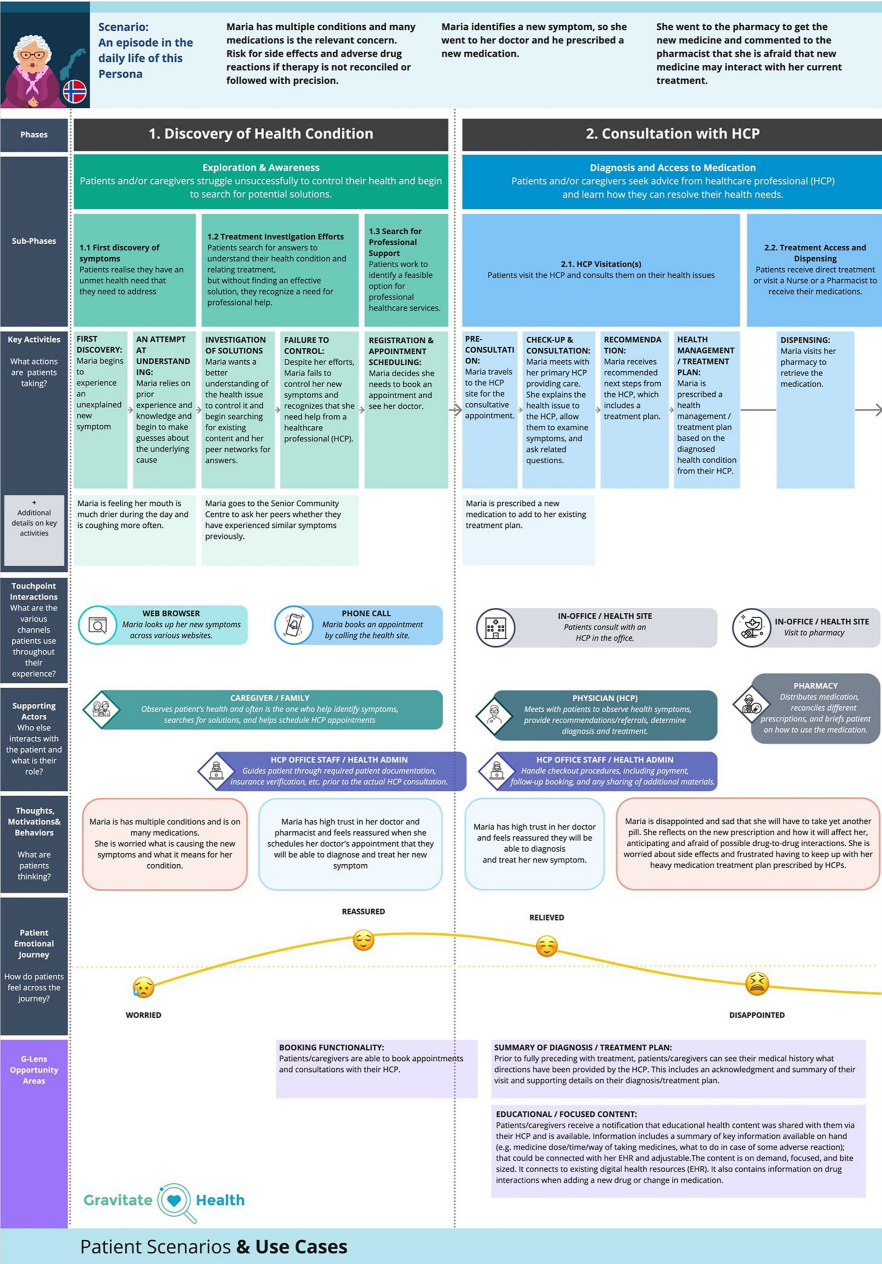


Figure 4.
Maria's patient journey

(continued)

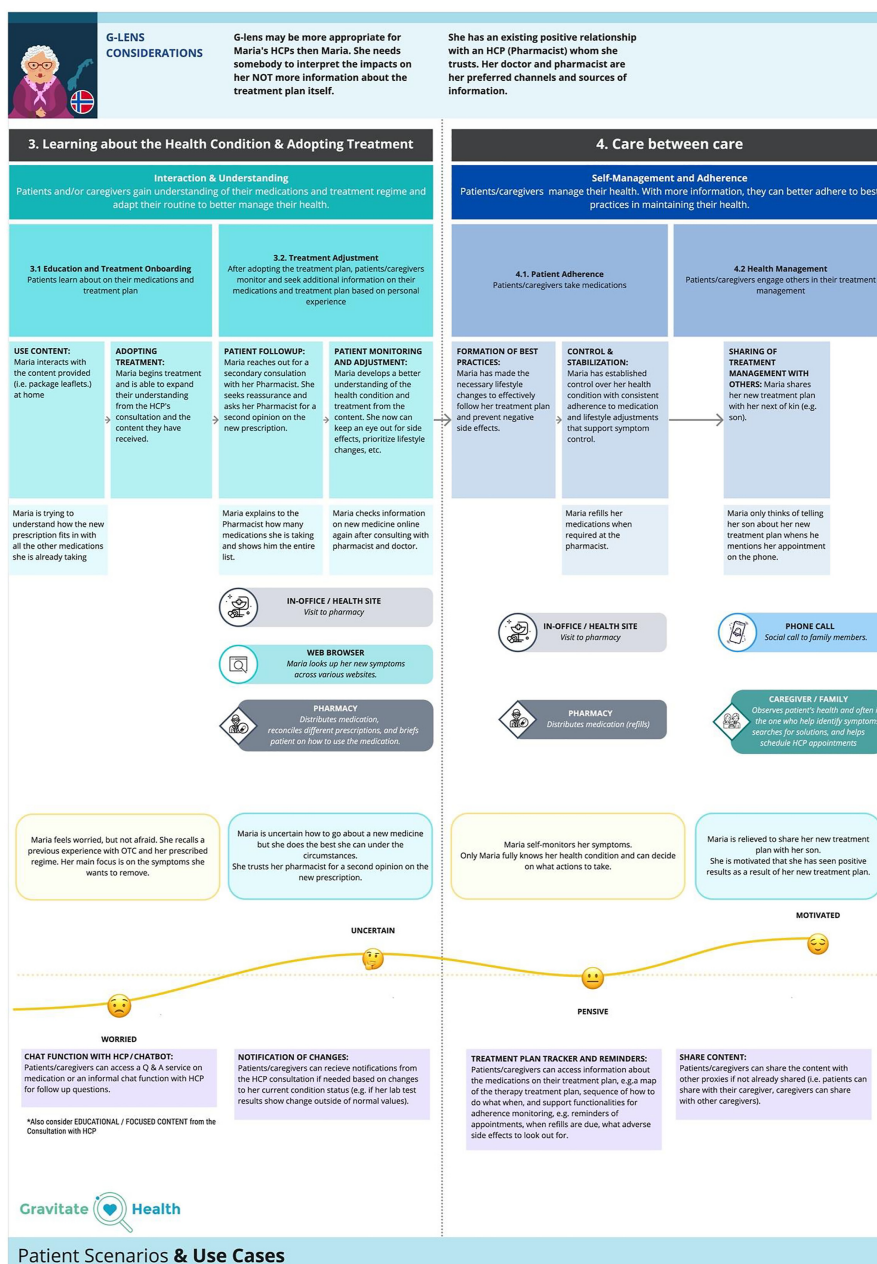


Figure 4.

Discussion

In this study, a multidisciplinary, public-private partnership attempted use a co-creation process and the first steps towards developing an integrated digital tool to improve access,

understanding and adherence to treatment for diverse groups of patients across all stages of their health journeys in a number of countries including EU and USA.

Numerous studies show the integral role that co-creation has in innovation work, with some citing creativity and co-design as the most central component of the process of innovation (Munt and Hargreaves, 2009; Petrati and Nielsen, 2018; Bird *et al.*, 2021; Simonse *et al.*, 2019). The co-design strategies for healthcare innovation include lived experiences of end-users in research, generate ideas for patient-centered service improvements, empower and engage the included groups and tailor interventions to end-users' needs and requirements thus increasing the likelihood of their adoption and integration (Frow *et al.*, 2015; Fox *et al.*, 2018; Thabrew *et al.*, 2018; Graffigna and Barelo, 2018). Co-creating the digital tool has involved a mix of methodologies and approaches including qualitative and quantitative research, gathering needs with testing scenarios, engaging UAG to guide the outcomes, facilitating feedback gathering sessions and co-creation workshops. Working closer with patients – whether that's as co-creators in a workshop or an advisory panel – allowed us to look out from the inside, rather than outside in, taking advantage of the accumulative life-long learnt experience, self-reflection and self-knowledge that goes above and beyond the assumed repeated behaviors and predictable outcomes. For the work reported here, harnessing the power of co-creation and delivering solutions that resonate and encourage feedback from actual users' changes the paradigm to foster human-centered health innovation and played a vital role in helping us build tangible recommendations based on astute and actionable insights.

Stakeholders, and in particular the UAG, who have been involved with co-creating the digital solution since inception, are critical team members in ensuring the success of the Gravitare-Health project. In being fully immersed in the development of the digital solution from the beginning, the user's expertise enables to support the overall goals of the project. The process featured distinctive ways of interacting and engaging in decisional negotiations between the patient and the healthcare system that depend closely on the phase of the process through which the patient is passing through.

Taking this work a step further, the personas and service designs will be used as we build a prototype, where co-creation workshops will be mainly on the design and content, and the emotional and behavioral impact the prototype created. We will deep dive into the use of language, tone of voice, feature design and imagery to gauge their effects when used in various combinations. By using the co-creation process in the Gravitare-Health project, we aim to increase the possibility that the improved availability and understanding of health information from trusted sources translates to higher levels of adherence to treatment, safer use of medication (pharmacovigilance), better health outcomes and quality of life throughout the integrated patient journey. The co-creation process described in this paper develops new and deeper insights into how the use of available health information can be optimized to act as effective risk minimization measure. This provides valuable testing grounds for new services and an evaluation framework to test the efficiency, efficacy and safety of integrated digital health services.

Healthcare delivery relies on a variety of interlocking ecosystems, where many of the problems are multifaceted and inherently human (World Health Organization, 2015). Leading in this disruptive era requires a range of new attitudes and traits: empathy, purpose, acting on behalf of all healthcare stakeholders, the ability to seek a range of inputs yet being decisive, being outcome-focused, providing strong vision-setting and balancing risks. Going beyond the digital and operational fabric, integrated health requires getting closer to the people at the center of care delivery. What we need above all is a new way to shape how we engage, connect and make healthcare transformation happen on a fundamental human level.

The personas and patient journey results will serve as inputs for development of a holistic service design blueprint and a unified journey across the stages of the patient

journey. Moreover, these results will surface and uncover patient requirements for the prototype development. By putting a structured human-centered process in place to effectively capture insights and working directly with patients to identify initiatives that will bring benefits to their lives created a trusted environment. Here patients' voices were not only heard but their creative contributions were directly implemented throughout the design process, contributing to the integration throughout their patient journey.

Strengths and limitations

Humanizing the design process in the initial stages of the project allows for meaningful deep dives into the development of the unique features based on the personas and their interactions with the solution, underpinned by the diversity of the patient journeys based on real-world examples in self-care, active treatment and self-management phases. Taking the human-centered design approach and following the flow of the design thinking methodology helped identify key themes that informed our requirements and the emerging needs and tasks the patients want to perform, setting out our vision that can be traced back to specific patient needs and pain points along the journeys patients embark on in interaction with their healthcare. All the factors we can translate into relevant opportunities and a true path forward.

As the design method and the co-creation techniques are closely related to qualitative research methods, sample size is one of the possible limitations. Moreover, participation of key end-users to shape the digital solution may result in an overreliance on the perspectives of the UAG, a few end-users, who may not be representative of the larger population of interest. However, the work presented here is a starting point, and the risk of overreliance as limitation will be or adjusted for in our adopted step-wise, agile approach.

Conclusion

Any end-user interaction is an opportunity to build up our knowledge and understanding of patients. In order to maximize the effectiveness of any engagement, the interactions should be focused on retaining the insights and making them accessible to future project teams. Methods to measure health literacy and ways to integrate new parameters into healthcare protocols that support patient needs are needed for development of digital tools for integrated care pathways.

Creating useful tools such as personas, and user journeys for a digital, user-centric health information solution, is the first installment allowing teams to continuously use patient insight as a guide for patient-centered decision making across the entire product or a service design life-cycle, and thus enable the integration of the solution throughout the whole patient journey.

Notes

1. The Gravitare-Health is a public – private partnership with 40 members from Europe and the US, co-led by University of Oslo (coordinator) and Pfizer (industry lead), funded by the Innovative Medicines Initiative (IMI) under contract no 945334– a joint undertaking of the European Commission, the European Federation of Pharmaceutical Industries and Associations (EFPIA), IMI2 Associated Partners. www.gravitarehealth.eu
2. <https://www.med.uio.no/helsam/english/research/projects/capable/>
3. <https://futurium.ec.europa.eu/en/active-and-healthy-living-digital-world/library/eip-aha-blueprint-personas>
4. https://www.gravitarehealth.eu/wp-content/uploads/2021/11/Gravitare-Health_D1.2-Personas_V2.0_final.pdf

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