Preliminary Results On User Needs Regarding Development And Implementation Of A Virtual Rehabilitation Clinic

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Presenter: Reinoud Achterkamp

Abstract

Background: Technology offers the possibility to reduce workload on healthcare professionals and provide efficient care and access to rehabilitation regardless of location. However, current virtual rehabilitation technologies are primarily used in a local setting. Within the Interreg Scale-Up4Rehab project our overall aim is to build and implement an open virtual rehabilitation 'clinic', through which existing virtual therapies will be scaled up. It is crucial to involve end-users in an early stage. As such, the initial goal was to obtain insight in our target populations' thoughts about two options for the virtual clinic: one in which rehabilitation applications are accessible through an app on tablet, smartphone or television, versus one in which these programs are delivered through virtual reality goggles.

Method: The patient council of a local rehabilitation centre (n=8) was asked to complete an online questionnaire about advantages and disadvantages of the options described above and asked to indicate which option they preferred.

Results: All patients were positive about rehabilitation at home through a virtual clinic. An application on a tablet or smartphone was preferred over a virtual reality based application. Advantages included fast access to care and freedom of performing exercises at one's own convenience. Disadvantages included absence of personal contact with professionals and the possibility of insufficient technological skills. Advantages of the second idea included higher level of immersion and more modern and future-oriented. Disadvantages included absence of personal contact and a too high level of complexity for the average patient. Seven out of eight patients indicated they possess sufficient skills to use the technology as suggested.

Conclusion: To further develop, successfully implement and scale up the virutal rehabilitation clinic, identification of user needs are crucial; the current preliminary results indicate that patients from a local patient council prefer a two-dimensional application over a virtual reality based application.

Demonstration Of Untire Now: Enhanced Support For Cancer-Related Fatigue

Fatemeh Akbari (Tired of Cancer - Netherlands), Simon Spahrkäs (Tired of Cancer - Netherlands), Bram Kuiper (Tired of Cancer - Netherlands)

Presenter: Fatemeh Akbari

Abstract

Cancer-related fatigue (CRF) is the most invalidating side-effect of cancer. CRF affects almost 65% of patients with cancer and may persist years after treatment. Fatigue negatively affects patients' personal, social/work life, leading to a decline in their overall quality of life. The Untire app is the first multimodal digital therapeutic (DTx) for cancer patients and survivors who suffer from moderate to severe CRF. The app comprises evidence-based treatment, including cognitive behavioral therapy, and acceptance and commitment therapy.

Tired of Cancer's continued efforts to support CRF management has led to the development of Untire Now. Untire Now expands the scope of the original app by incorporating a broader spectrum of physical activities and introducing a novel energy conservation technique (Building Up Reserve). Moreover, more themes are included in the Untire Now (e.g., work, and depression).

Description: The application begins with a comprehensive initial assessment where users rate their happiness and fatigue on a 10-point scale and express their energy levels as a percentage (0% - 100%). This data is stored in the user's profile, serving as a benchmark for personal progress tracking. In the second measurement, users identify how they allocate their energy by indicating activities that give or deplete energy, providing insights into energy distribution. Besides an assessment of their fatigue, happiness, and energy the user is also asked to define their own desired outcome in the form of a personal goal. Apart from this, the user should enter a score from 1- 10, to gauge proximity to their goal and then the user gets the result based on their score. This goal can then serve as a personal motivation for using the app. Once the program is setup, the user will receive their program daily with suggested categories incorporating all integral elements – themes, physical activity, and relaxation. This user-centric approach aims to enhance overall well-being by addressing happiness, fatigue, and energy levels.

Practical description of demo: The demo will be presented as part of the symposium.

User Needs For Optimal Use Of Digital Self-Management Applications According To Two Specific Target Groups

Brigitta Keij (RIVM - Netherlands), Eva Alblas (RIVM - Netherlands), Jelle Keuper (Nivel - Netherlands), Lilian van Tuyl (Nivel - Netherlands), Liza van Deursen (RIVM - Netherlands), Jiska Aardoom (LUMC - Netherlands), Roos van der Vaart (RIVM - Netherlands)

Presenter: Eva Alblas

Abstract

Background: The healthcare sector is under pressure due to aging populations, staff shortages and rising costs. Digital self-management applications have the potential to alleviate some of this pressure, as they can contribute to better health or prevention of (further) care needs. In this study we investigated what is needed to optimally make use of digital self-management applications, by two specific target groups; individuals with an enhanced risk of type 2 diabetes and cancer survivors.

Methods: Individuals with an enhanced risk of type 2 diabetes (n=10) and cancer survivors (n=14) were individually interviewed about their use of, experiences with, and needs for digital self-management applications. Specifically, we explored what they (expected to) need to optimally make use of digital lifestyle management and after care applications, respectively.

Findings: Generally, participants had a positive attitude towards digital self-management applications, and they thought that these applications could help them manage their health. However, several conditions should be met when using digital self-management applications, in order to successfully change their lifestyle or improve their post-cancer treatment. Most importantly, sufficient support from (health care) professionals is needed, for referral, but also for guidance with (adjusting) goalsetting. Additionally, the programs should be accessible financially, but also in terms of user-friendliness.

Conclusion: Health care providers should take the lead in referral to these applications, preferably at low or zero costs to the user. Additionally, it is expected that the use, and the potential effectiveness, of digital self-management applications can be optimized or enhanced by a certain level of involvement of a (health care) professional.

Digital Health Equity: Evaluating And Enhancing The 'Inclusive eHealth Guide' For Tailored Interventions In Lower Socioeconomic Position Populations

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Presenter: Isra Al-Dhahir

Abstract

Background: Despite the potential of eHealth to improve healthcare for socially disadvantaged individuals, adoption and long-term use are lower among individuals with a lower socioeconomic position (SEP). This contributes to increased health disparities and a widening health gap. To help bridge this gap, we developed the Inclusive eHealth Guide (IeG), a practical tool for researchers and professionals, to help create accessible interventions and foster eHealth use and adoption. This study aims to evaluate professionals' perceptions of the IeG to refine and improve its content.

Method: The IeG was evaluated through think-aloud interviews with 13 professionals involved with 8 eHealth lifestyle interventions. Professionals included researchers, project managers, and health professionals. Thematic analysis was used for data analysis.

Results: Findings highlight the guide's strong assets: its practicality, user-friendliness, and comprehensive content were highly evaluated. Participants appreciated the practical information, concise communication, and scientific literature. Recommendations for future improvement consisted of adding more practical information using real-life examples, catering to diverse professional backgrounds, adding more information on the implementation and evaluation phase, balancing scientific rigor for users with and without a scientific background, and providing more sources.

Discussion: The positive reception and recommendations for the IeG underscore its potential to stimulate the development of tailored eHealth interventions for people with low SEP. This effort aims to bridge health disparities by offering user-centered insights for effective development and implementation.

A Reinforcement Learning Model For Proposing Smoking Cessation Activities That Build Competencies: Combining Smoker And Health Expert Viewpoints

Nele Albers (Delft University of Technology - Netherlands), Mark A. Neerincx (Delft University of Technology - Netherlands), Willem-Paul Brinkman (Delft University of Technology - Netherlands)

Presenter: Nele Albers

Abstract

Background: Achieving personal goals often necessitates building competencies, such as understanding one's strengths. However, non-expert clients and expert health professionals often think differently about which competencies are required. Simply recommending activities for building "expert-devised" competencies may not motivate clients to engage with them, while exclusively relying on activities for "non-expert devised" competencies may overlook crucial competencies.

Methods: Therefore, we devised a modeling method that integrates both client and expert viewpoints. Specifically, we created a pipeline for constructing a reinforcement learning model for proposing activities for quitting smoking (e.g., envisioning one's desired future self, learning about nicotine replacement therapy). This model considers smokers' current and future levels for expert-devised competencies (i.e., expert viewpoint) as well as their beliefs about competency usefulness (i.e., client viewpoint) when choosing activities. The ultimate objective of the model is to build expert-devised competencies over time.

Findings: Drawing on data from a study involving 542 daily smokers interacting with a virtual coach across five sessions, our simulations demonstrate the importance of considering smokers' current levels for the expert competencies and their usefulness beliefs when striving to build expert competencies. In fact, we observed improvements of up to 22% in built expert competencies when considering current competencies, and an additional 14% when also accounting for usefulness beliefs. Furthermore, our analysis shows that while persuasive activities can influence smokers' beliefs about competency usefulness, the effects might be too small to include persuasive activities in an optimal competency-building strategy.

Conclusion: We hope that our work can serve as an example for effectively incorporating different worldviews in a reinforcement learning model for building competencies. In addition, rather than attempting to convince people of the usefulness of certain activities, it may be more fruitful to identify and promote activities that align with people's existing usefulness beliefs.

Dental Care Prevention In Low Socio-Economic Families: A Qualitative Study

Marielle de Haan (Inholland University of Applied Sciences - Netherlands), Laurence Alpay (Inholland University of Applied Sciences - Netherlands), Annet Nan (Inholland University of Applied Sciences - Netherlands)

Presenter: Laurence Alpay

Abstract

Background: Prevention of caries in low socio-economic families within the first 1000 days of life, also called Early Childhood Caries (ECC) is one important aim of the METAHEALTH project This explorative study reports on the ways dental care professionals approach preventive education to this targeted group.

Method: Semi-structured interview was used as the qualitative research method. Topics addressed included , current practices, interactions with parents of young children, challenges faced, technological insights, and collaborative efforts among dental care providers. Rigorous procedures ensured validity and reliability, including systematic data collection, participant selection, neutral interview settings, interviewer training, verbatim transcription, and thorough coding using Atlas.Ti software, ultimately facilitating coherent data analysis and relationship establishment.

Findings: Seven dental care professionals participated. Results regarding technology usage for preventive oral care indicate a preference for media channels like apps and websites, especially to reach families with low socioeconomic status. Suggestions include multilingual options and integrating dental messages into games. Some are skeptical, preferring human interaction. One provider mentioned the need for user-friendly tools, while another joked about futuristic tech advancements.

Conclusions: Dental care providers employ diverse approaches to provide preventive oral care to parents of children under three, particularly those with low socioeconomic status Lack of uniformity leads to methodological variations, yet providers agree on the importance of consistency. They adapt by simplifying information, addressing language barriers, and discussing affordable treatment options. Many recognize the potential of media channels like apps and games, proposing innovations such as technology-assisted treatment summaries, although some providers remain hesitant about technology adoption.

Meeting Your Virtual Selves: A Systematic Review Of Multiple Selves Exercises In Immersive Virtual Reality

Judith Austin (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Anneke Sools (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Christina Bode (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands)

Presenter: Judith Austin

Abstract

Background: Multiple selves exercises foster psychological flexibility and adaptability by expanding the range of available emotions and behaviors in individuals. For example, imagining an alternative or future self who is healthy and vibrant can facilitate current healthy dietary choices. These exercises traditionally are offered offline (e.g., with letter writing), yet their reliance on mechanisms such as embodiment and perspective switching offers a potential match for immersive VR. This review mapped and assessed the translation of multiple selves exercises and their theoretical underpinnings to the unique characteristics of immersive VR.

Methods: A convergent mixed methods review was conducted. Five databases (Web of Science, PsycINFO, PubMed, IEEE, Scopus) were searched in February 2024, without study design or date restrictions. The search string consisted of four components addressing immersive VR, multiple selves, outcomes and applications. Studies were eligible if they contained original data regarding the design and/or evaluation of multiple selves exercises in immersive VR.

Findings: Forthcoming findings will illustrate the characteristics, theoretical underpinnings and working mechanisms of multiple selves exercises, and the ways in which these are translated to the medium of VR (e.g., techniques such as first-person embodiment or mirror perspective; and characteristics such as interactivity, personalization and adaptation). In addition, user experiences, feasibility and acceptability; process outcomes (e.g., connection with a virtual self); and effects (e.g., improved well-being) will be presented. Last, connections between the types of multiple selves exercises and the applied VR techniques and characteristics will be discussed.

Conclusion: This review will guide further research and development of the promising translation of multiple selves exercises to immersive VR.

Future Homes: Virtual Reality As An eHealth Development Tool To Conduct Needs Assessment

Judith Austin (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Kai Rosen (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Christina Bode (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands)

Presenter: Judith Austin

Abstract

Background: In eHealth development and research, needs assessment relies heavily on asking end-users what they find important regarding a technology. However, such methods primarily build on cognitive assessment, and do not take people's emotional and behavioral needs into account. Furthermore, it is often difficult to imagine a future technology that one is not yet familiar with. Virtual reality (VR) offers unique opportunities to visualize, experience and interact with a to-be-developed technology. Yet in most health research, VR is primarily used as an intervention or measurement platform. In this project, we combine innovative futuring methods and scenario research to explore the potential of VR as a development tool for new eHealth interventions and technology.

Description: As part of the 4TU RECENTRE consortium, 'future home' virtual environments were created for use with immersive virtual reality, consisting of an interactive apartment situated in the future. The 'future home' environments were developed to study needs, values and experiences of various patient groups (including people with obesity or breast cancer). The virtual environments will let patients experience first-hand the use of upcoming sensor technology in the home setting, combined with receiving personalized risk-based lifestyle recommendations and adaptive interventions.

Practical description: After an introduction of the project background, a plenary video demonstration will showcase the virtual environment. In addition, virtual reality glasses will enable individual participants to experience the virtual environment directly.

Compas-Y: Pilot Evaluation And Next Development Steps For A Self-Compassion App For People With Cancer

Judith Austin (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Maya Schroevers (Department of Health Psychology, University Medical Center Groningen, Groningen, The Netherlands - Netherlands), Robbert Sanderman (Department of Health Psychology, University Medical Center Groningen, Groningen, The Netherlands - Netherlands), Ernst Bohlmeijer (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Stans Drossaert (Section of Psychology, Health & Technology, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands)

Presenter: Judith Austin

Abstract

Background: The app Compas-Y aims to support people with newly diagnosed cancer in their wellbeing and self-compassion. It was co-designed based on integrating Compassionate Mind Training with the needs and wishes of people with cancer, and consists of 6 training modules and supportive functionalities. This study will report on a mixed methods pilot study evaluating the use, appreciation and impact of the app Compas-Y, and based on the findings present the next steps in the development of the app.

Methods: Seventy-one people with cancer who created an app account were included in the pilot study, recruited in 2022 via oncology nurses (38% breast cancer, 72% diagnosed <4 months ago, 76% received chemotherapy). Back-end log-data (n=71), pre-post surveys (n=34) and semi-structured interviews (n=23) were concurrently analyzed. Oncology nurses (n=8) were interviewed about the implementation of the app.

Findings: Compas-Y was highly appreciated, with all content considered relevant and a source of support. Nearly half of participants (45%) used 4 of the 6 modules. Participants reported that the app was supportive for their wellbeing, emotion regulation and self-compassion, although the qualitative findings were not always supported by the surveys. Results showed that primarily people already high in wellbeing or self-compassion were reached, and that use patterns and preferences regarding the most useful components of the app and the best time to receive the app differed greatly.

Conclusions: The pilot study established that Compas-Y is highly appreciated and a source of emotional support shortly after diagnosis. Current next steps in the development and implementation of the app include: 1) expanding the reach and target group of the intervention including people with low wellbeing and/or who were diagnosed longer ago 2) investigating other implementation routes such as via general practitioners and blended support 3) distinguishing different user groups and use patterns with longitudinal research.

Working Towards Personalized Intervention Advice For Breast Cancer Patients Who Experience Cancer-Related Fatigue

Lian Beenhakker (University of Twente, Enschede - Netherlands), Kim A.E. Wijlens (University of Twente, Enschede - Netherlands), Annemieke Witteveen (University of Twente, Enschede - Netherlands), Christina Bode (University of Twente, Enschede - Netherlands), Sabine Siesling (University of Twente, Enschede; Netherlands Comprehensive Cancer Organisation (IKNL), Utrecht - Netherlands), Miriam M.R. Vollenbroek-Hutten (University of Twente, Enschede; Medisch Spectrum Twente, Enschede - Netherlands)

Presenter: Lian Beenhakker

Abstract

Background: One of the most reported long-term effects after breast cancer is cancer-related fatigue (CRF), which can be persistent up to ten years after diagnosis. To support breast cancer survivors, the PARTNR (Personalized cAnceR TreatmeNt and caRe) project works towards a decision support tool in which users receive personalized advice for an intervention for CRF based on both patient preferences ("what fits whom?") and intervention effectiveness ("what works for whom?").

Methods: The suggested intervention should fit patient preferences, which we expect to differ between individuals. To show this, we set up a preference study to collect, compare and contrast patient preferences regarding various intervention attributes identified in a previous review. Best-Worst Scaling (BWS) was used and the survey was sent to breast cancer patients via the Dutch Breast Cancer Organisation (BVN). These preferences should be linked to existing interventions with decision rules, to further develop the personalized advice.

Findings: Our preference study (n=67) showed that, when comparing group level preferences to individual preferences, at most, 19% of the participants agree with the average preference. Additionally, we set up a first set of decision rules to link patient preferences to various eHealth interventions. These show users which intervention fits their preferences best and on what aspects their preferences mismatch with an intervention.

Conclusion: Regarding "what fits whom?", our preference study showed that indeed personalization on preferences is needed. Some first decision rules were set up to rank possible interventions for CRF for an individual. In future work, we focus on "what works for whom?", by analysing intervention effectiveness on individual level. If we can predict the effect of different types of interventions, this information can be included in the decision rules, further personalizing the intervention advice. This will support breast cancer patients with CRF and can improve their quality of life.

Individual Effectiveness Of Psychosocial And Exercise Interventions On Breast Cancer Related-Fatigue – What Works For Whom?

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Presenter: Lian Beenhakker

Abstract

Background: Breast cancer significantly affects patients' quality of life. After diagnosis and treatment, many patients experience long-term effects like cancer-related fatigue (CRF), 30% even up to ten years after diagnosis. The most commonly used non-pharmacological interventions to support patients with CRF, are exercise or psychosocial interventions. On group-level, both interventions are effective, however, to support the individual patient, it is important to know what intervention works best for whom. Therefore, this study aims to identify the most effective intervention for individual patients.

Methods: The Predicting OptimaL cAncer RehabIlitation and Supportive care (POLARIS) database (doi: 10.1186/2046-4053-2-75) with individual participant data was used to select randomized controlled trials (RCTs) that measured fatigue in breast cancer patients. Patient-reported outcome measures (fatigue, depression, and anxiety) were included by pooling various questionnaires. Previous analyses on the POLARIS database focussed on either exercise or psychosocial studies on group-level, in this study, we combined the two intervention types. In the next steps of our analysis, we will select variables to build various machine learning models to predict individual intervention effectiveness. This process follows a step-by-step approach, starting simple and extending if needed for improved predictions.

Findings: From 34 RCTs, we included 4429 patients with breast cancer with fatigue data available at the start of their intervention. Of those, 1667 participants followed an exercise intervention, 816 participants followed a psychosocial intervention, and 1946 participants were in the control group. Further findings will be presented at the conference. We expect to find individual level differences between intervention types.

Conclusions/discussion: In this study, we are working towards a machine learning model for prediction of intervention effectiveness. Ideally, this model will serve as a valuable tool selecting the most effective intervention for individual breast cancer patients with CRF.

Tackling Climate Change-Driven Zoonotic Infections - Adopting A GeoSocioTechMed Approach.

Nienke Beerlage-de Jong (Health Technology and Services Research, Technical Medical Centre, University of Twente - Netherlands), Caroline Kioko (ITC Faculty Geo-Information Science and Earth Observation, University of Twente - Netherlands), Nils Tjaden (ITC Faculty Geo-Information Science and Earth Observation, University of Twente - Netherlands), Nashwan Al Naiemi (Laboratory for Medical Microbiology and Public Health (Labmicta) - Netherlands), Annelies Riezebos-Brilman (Laboratory for Medical Microbiology and Public Health (Labmicta) - Netherlands), Felix Geeraedts (Laboratory for Medical Microbiology and Public Health (Labmicta) - Netherlands), Justine Blanford (ITC Faculty Geo-Information Science and Earth Observation, University of Twente - Netherlands)

Presenter: Nienke Beerlage-de Jong

Abstract

Background: Over 60% of new infectious diseases are zoonotic, with 75% of the 30 new pathogens in the last three decades originating from animals (Jones et al, 2008). Climate change has influenced the emergence of zoonotic infections in new areas. Zoonotic infections are a significant global health concern, causing approximately one billion illnesses and millions of deaths annually (Jones et al, 2008).

However, many zoonotic infections remain undiagnosed, partly due to a lack of physician awareness of local zoonotic risks. Enhanced diagnostic capacity and clinician awareness of zoonoses are crucial for managing outbreaks (Judson & Rabinowitz, 2021). This project brings together relevant expertise through a novel GeoSocioTechMed approach to (1) improve understanding of zoonotic infections' occurrence (influenced by climate change) and (2) investigate how to optimally support physicians in diagnosis.

Methods: The pilot study focused on the Twente-Achterhoek region, utilizing available health data from Labmicta. It included rodent-borne (hantavirus and leptospirosis) and vector-borne (Lyme and tick-borne encephalitis) zoonotic infections. Literature on climate-related risk factors for zoonotic infections was reviewed, and environmental data from 2016-2023 were used to create risk maps. These maps were compared with spatiotemporal zoonotic disease distribution maps to assess changing risk patterns.

Concurrently, a tool using the R package 'Shiny' was developed to aid physicians in diagnosing zoonotic infections. This tool (ZIRTAmap) was prototyped and evaluated with GPs and clinical-microbiologists.

Findings: The study revealed distinct environmental risk patterns for zoonotic infections, aiding in identifying high-risk areas. The interactive map developed shows promise in making complex health-related information accessible to physicians, public health officials, and the public.

Conclusion: The GeoSocioTechMed approach enhances understanding and management of zoonotic infections. The interactive nature of ZIRTAmap is particularly effective for

addressing complex issues involving spatial and temporal dynamics and integrating new concepts into daily practice.

Second Edition Of The 'eHealth Research Theory And Development: A Multidisciplinary Approach' Book

Hanneke Kip (University of Twente - Netherlands), Nienke Beerlage-de Jong (University of Twente - Netherlands), Lisette van Gemert-Pijnen (University of Twente - Netherlands), Robbert Sanderman (University Medical Centre Groningen - Netherlands), Saskia Kelders (University of Twente - Netherlands)

Presenter: Nienke Beerlage-de Jong

Abstract

Background: In both research and practice, an increasing amount of attention is paid to eHealth – the use of technology to support health, healthcare, and wellbeing. Since the publication of the first edition of our book in 2018, many new studies were conducted, new technologies developed, new models and theories introduced, and existing ones updated. Furthermore, the challenges that healthcare is faced with have not decreased since then; if anything, problems related to staff shortages, limited budgets, and patients with more complex (chronic) diseases have grown even further. Consequently, a second edition of this book was called for.

Methods: The first part of the book is focused on the underpinnings of eHealth, comprising chapters on behaviour change, the possibilities of technology for healthcare systems, and the current state of affairs of eHealth for mental and public health. In the second part, chapters on development, implementation, and evaluation of eHealth are provided, presenting methods, theories and frameworks from disciplines such as human-centred design, engineering, psychology, business modelling, and implementation science.

Findings: By bringing together expertise from different disciplines, the book offers a holistic approach to the use of technology to support health and wellbeing, giving readers insight into how eHealth can offer multiple solutions for the major challenges with which our healthcare system is faced.

Conclusion: This book provides a comprehensive overview of the multidisciplinary domain of eHealth. It provides an overview of the possibilities of eHealth for different healthcare sectors, an outline of theoretical underpinnings and effectiveness, and key models, frameworks and methods for its development, implementation, and evaluation.

Due to its multidisciplinary nature, it can be used by a broad range of readers – from students to healthcare professionals – from a broad range of fields – such as psychology, health sciences, and human-centred design.

Risk Assessment Using A Virtual Assistant In A Digital Genetic Counselling Application

Tessa Beinema (University of Twente, Enschede - Netherlands), Jan Kolkmeier (University of Twente, Enschede - Netherlands), Randy Klaassen (University of Twente, Enschede - Netherlands), Lieke van den Heuvel (University Medical Center Utrecht, Utrecht - Netherlands), Marten Siemelink (University Medical Center Utrecht, Utrecht - Netherlands), Marlies van Lingen (University Medical Center Utrecht, Utrecht - Netherlands), Dianne van Essen (KAESS Creative Agency, Den Haag - Netherlands), Peter van Tintelen (University Medical Center Utrecht, Utrecht - Netherlands), Dirk Heylen (University of Twente, Enschede - Netherlands)

Presenter: Tessa Beinema

Abstract

Background: Family members of someone with an inheritable cardiac condition have to make an informed choice on whether or not to undergo a DNA test. The DNA-poli platform, which includes a virtual assistant (VA), was developed to digitally support them in this process.

Since specific medical and social aspects require additional attention from a health care professional (HCP), we designed and developed a risk assessment mechanism as part of the application. E.g., having extreme worries, presence of potential symptoms or being an identical twin can all significantly impact a HCP's advice.

Methods: We specified the risk assessment process by 1. Deciding on a mechanism of screening and follow-up questions, 2. Iteratively defining a list of risks in collaboration with HCPs, 3. Defining initial checking questions for the information pages and selecting follow-up questions, 4. Iteratively writing dialogues for the VA with HCPs' feedback, and 5. Designing overviews for HCPs and users to gain insight into the users' responses.

Findings: The resulting risk assessment consists of user-facing functions, such as the inclusion of screening questions on the DNA-poli's information screens and follow-up dialogues with the VA. HCPs can check family members' responses through a short-hand overview before they jointly discuss their final choice.

An initial list of risks was reduced from 28 to 13 items. The implementation includes nine initial checking questions with eight follow-up dialogues. The follow-up questions in these dialogues were mostly based on the Dutch cardiac version of the Psychosocial Aspects of Hereditary Cancer (PAHC) questionnaire. Upon indicating their preliminary preference for a DNA test family members go through a dialogue with questions that cover a set of three symptom-related risks.

Conclusion: So far responses to the risk assessment are positive. A randomized controlled trial to compare the DNA-poli platform to usual care started in 2023.

A Collaborative Approach Of AI Design Criteria With Non-AI Experts

Marwan El Morabet (Amsterdam University of Applied Sciences - Netherlands), Saskia Robben (Amsterdam University of Applied Sciences - Netherlands), Somaya Ben Allouch (Amsterdam University of Applied Sciences, University of Amsterdam - Netherlands)

Presenter: Somaya Ben Allouch

Abstract

Background: Extreme citizen science aims to take co-creation a step further, with citizens being an equal partner in research projects and being as much in control as experts. In our project ("It Takes a Village To Grow Old") on designing an Artificial Intelligence (AI) art intervention in the public space to facilitate public familiarity, this necessitates (older) citizens to navigate challenging decisions regarding the design of an AI system. This work aims to: 1) raise awareness of ethical and practical considerations with a new method centered around the 7 Key Requirements from the EU Guidelines of Trustworthy AI (https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai), and 2) use this approach for formulating design criteria for an AI system together with non-technical citizens.

Methods: Three sessions were conducted in 2023 with non-AI expert participants (n=28) having diverse backgrounds: academics (n=2), creative professionals and researchers (n=18), and older adults (n=8). Initially, participants engaged with a prototype of the "Story Wall" social storytelling application developed during the citizen science project. Subsequently, the 7 Key Requirements from the EU Guidelines were introduced, each serving as a discussion point. Participants generated pro and con arguments on post-it notes in small groups, followed by larger group discussions.

Findings: Engaging participants with limited understanding of AI in discussions about ethical considerations and consequences of the AI system proved insightful. Topics such as privacy and data governance, transparency, diversity, non-discrimination, fairness, and accountability sparked substantial discussion. Participants delved into the implications of these concepts, highlighting concerns and potential consequences associated with the design and implementation of the AI system. These outcomes have led to multiple changes to the AI art prototype intervention.

Conclusion: The used methodology facilitated collaboration among diverse participant groups in designing an AI system for older non-AI experts. Participants demonstrated informed decision-making and comprehension of ethical considerations, guided by the EU Guidelines for Trustworthy AI. This structured framework showed to be useful in facilitating discussions and decision-making processes around AI interventions for public familiarity.

The Role Of Personal, Social And Cultural Capital In Addition To Economic Capital In The Explanation Of (In)Equities In The Use Of Digital Health Technology

Joyce Bierbooms (Tilburg University, Tranzo - Netherlands), Marieke van Egmond (Tilburg University, Tranzo - Netherlands), Melanie de Looper (Tilburg University, Tranzo - Netherlands), Anne-Mette Hermans (Tilburg University, Tranzo - Netherlands)

Presenter: Joyce Bierbooms

Abstract

Background: Previous research indicates that people with a lower socioeconomic position benefit less from digital health technology than those with a higher socioeconomic position. In this context, inequality is predominantly operationalized as differences in economic capital. However, a more comprehensive definition of inequality that encompasses social, cultural and personal differences in capital provides a richer understanding of how inequality affects the intention to use digital technology for health.

Methods: We conducted a survey to examine the complex relationship between social inequalities and the use of health technologies for both mental and physical health in the Dutch population. Participants (n = 1,083) completed (existing) self-report scales with Likert-rating items based on the Unified Theory of Acceptance and Use of Technology. This theory proposes nine conditions that predict the intention and current use of technology, including facilitating conditions and anxiety. Included measures for economic, social, personal, and cultural capital were derived from sociology.

Findings: First, correlation analysis reveals that all four types of capital correlate positively with facilitating conditions to use technology and negatively with anxiety. Hierarchical linear regression analysis with gender and age in step 1 and all four types of capital in step 2 reveals that cultural capital shows a stronger relationship with current use ($t = 2.17$, $p < .05$) and intended use of digital health technology ($t = 2.53$, $p < .05$) than economic capital does ($t_{currentuse} = .96$, $p > .05$, $t_{intendeduse} = .80$, $p > .05$). Further analyses will be conducted to analyze the results in more detail.

Conclusion: Our findings show that the relationship between social inequality and digital inequality is multidimensional. Examining the relationship between different types of capital and the (intended) use of health technology can contribute to developing person-centered health technologies and implementation strategies that are effective across societal groups.

Why Do Home-Based Rehabilitation Technologies Keep Ending Up In The Valley Of Death?

KE te Boekhorst (, Erasmus University of Rotterdam, Rotterdam - Netherlands), SJ Kuipers (Erasmus University of Rotterdam, Rotterdam - Netherlands), JM Cramm (Erasmus University of Rotterdam, Rotterdam - Netherlands), GM Ribbers (Erasmus University Medical Centre, Rotterdam, - Netherlands)

Presenter: Karlijn te Boekhorst

Abstract

Background: The increasing incidence of stroke survivors emphasizes the necessity for rehabilitation technology at home. However, the sustainable implementation of these technologies in the home setting has frequently been unsuccessful in daily practice, resulting in these technologies falling into the "valley of death." The goal of this study was to gain a comprehensive understanding of why it is often difficult to implement home-based rehabilitation technologies, even though numerous technologies are designed to help improve the motor skills of stroke survivors.

Methods: Using semi-structured interviews, various stakeholders across different levels reflected on the implementation of rehabilitation technology. In total, 22 interviews were conducted. Convenience sampling was used, and the interview content was analysed to generate themes representing factors that influence the implementation of home-based rehabilitation technology. The revealed themes were organised with the help of the Non-adoption, Abandonment, Scale-up, Spread, Sustainability (NASSS) framework.

Results: Several factors across six domains of the NASSS framework were identified that influenced the implementation of home-based rehabilitation technology. These encompass the diverse nature of the condition, the alignment (or misalignment) of developed technology with the care delivery process and the unique needs of the target group, the methodology for determining the value of the technology, the perceived sense of urgency, different interests between commercial parties and university technology developers, the self-perceived capabilities of stroke survivors, apprehensions about increased workload for staff and potential injuries, the presence of a formal implementation plan and funding, adherence to laws and regulations, and the existence of perverse financial incentives.

Conclusion: This study revealed insights into improving the development and implementation of rehabilitation technology. It offered a multidisciplinary perspective on factors enabling the adoption of home-based rehabilitation technologies and reasons for their underutilization, pointing out opportunities for improvement.

Do People Value AI-Based Health Services? Exploring The Role Of Human Values In Personalized Healthcare

Nadine Bol (Tilburg University, Tilburg - Netherlands), Marjolijn Antheunis (Tilburg University, Tilburg - Netherlands)

Presenter: Nadine Bol

Abstract

Background: Advances in AI have rapidly paved the way for personalized healthcare. Adapting medical treatments and preventive care to the specific individual characteristics offers preventive, participatory, and personalized care. Individuals' health data are increasingly at the core of AI-based decision making, but what these individuals find most important is often ill-considered. As we currently lack knowledge from a human-centric perspective, we investigate what human values help understand how people perceive and accept AI-based health services across contexts of cancer prevention, detection, and treatment.

Methods: Data were collected among a representative sample. Participants were randomly assigned to read one of three scenarios in which AI played a role in cancer-related prevention (personalized risk assessment), detection (screening), and treatment (personalized treatment options). Next, they completed statements on perceived risk and willingness to accept such AI-based services. These data were linked to data on terminal and instrumental values collected two months earlier.

Findings: Factor analyses revealed various value clusters, including moral-driven (e.g., responsible, forgiving) and competence-driven values (e.g., capable, intellectual). Higher scores on moral values were correlated with higher levels of risk perception, whereas higher scores on competence values were associated with perceiving lower risk and higher acceptance of using AI-based health services. Multi-group structural equation modeling showed that competence values were important when AI was used for cancer treatment rather than cancer prevention and detection.

Conclusion: AI-based healthcare services may elicit perceptions regarding their risk and acceptance. Our study suggests that these perceptions may depend on different human values. When driven by morality, people are more likely to perceive risks of AI-based healthcare, while when focused on competencies, people are less likely to perceive risks and more willing to accept AI. Nuances in these perceptions are context-dependent and should be explored in further research.

Satisfaction With Wacht@Ctief: A Minimally Guided eHealth Program For Individuals Waiting For Mental Health Care

Chantal van der Werf (Lentis, Groningen - Netherlands), Sanne Booij (Lentis, Groningen - Netherlands), Rogier Hoenders (Lentis, Groningen - Netherlands), Thomas van Hoorn (Lentis, Groningen - Netherlands), Christien Slofstra (Lentis, Groningen - Netherlands)

Presenter: Sanne Booij

Abstract

Background: The waiting times in mental health care (MHC) are long. Individuals suffer while waiting for MHC. Untreated mental disorders can result in a lower quality of life, more complaints and heavier care. That is why Wacht@ctief has been developed within Lentis; an eHealth program for people with mental health problems, who are waiting for intake. Wacht@ctief aims to reduce the negative consequences the waitlist and facilitate a better start of treatment. Wacht@ctief is currently being further developed, upscaled and evaluated amongst ten pilot departments using action research, with the fourth phase currently being completed. This substudy examined whether and how Wacht@ctief is used and evaluated by users, and how diversity factors (e.g., age, gender, education level, diagnosis) and hopefulness about positive change in their situation relate to individual differences in usage and satisfaction.

Methods: Wacht@ctief consists of an informative basic module, elective modules on positive health, self-help modules and solution-oriented coaching by an applied psychologist. Evaluation concerns usage data (n≈2500) and questionnaires at intake (n=678). Usage, evaluation data, diversity factors and hopefulness are described and examined using regression-based techniques.

Findings: Of the individuals invited, about 60% started Wacht@ctief and 20% completed the basic module. Individuals who started Wacht@ctief grade the program 6.1 on average (range 2 – 9). Users- and non-users did not significantly differ in terms of age, gender, education level or diagnosis. Individuals who were more satisfied with the program showed significantly increased hopefulness before the start of treatment.

Conclusion: Wacht@ctief shows promise to reduce some of the negative consequences of the (sometimes) long waiting times for MHC, at least for a subgroup of individuals. Qualitative research will be used to gain more insight into the needs of less satisfied users.

Steadymood: Towards An eHealth Self-Management Program For Sustainable Recovery From Depression

Sanne Booij (Lentis, Groningen - Netherlands), Rogier Hoenders (Lentis, Groningen - Netherlands), Stynke Castelein (Lentis, Groningen - Netherlands), Christien Slofstra (Lentis, Groningen - Netherlands)

Presenter: Sanne Booij

Abstract

Background: Depression is increasingly recognized as a chronic disorder; recurrence seems to be the rule rather than the exception. Still, much of the care is focused on the acute phase. Individuals with chronic conditions, such as depression, face the challenge of living an actively and emotionally satisfying life. Self-management programs (SMP) for depression can support individuals in achieving this, but there is no universal approach to SMP and a scarcity of studies evaluating these approaches in routine practice. Steadymood is an SMP for preventing relapse of depression by offering a relapse prevention plan, symptom monitoring, and (digital) solution-oriented coaching. The current study aimed to assess the user satisfaction with the program, and potential suggestions for improvement.

Methods: Steadymood is offered at a large mental healthcare institute in the North of the Netherlands. The current study consists of quantitative user data (n=97) and semi-structured qualitative interviews (n=10). Qualitative interview data was analyzed inductively with thematic analysis.

Results: Fifty percent of individuals used Steadymood >1 year, and 30% >3 years. Of all participants, 71.1% filled out the relapse prevention plan. The symptom questionnaire was filled out on average 20.6 times (range 1 - 81). Qualitative results suggest overall satisfaction with the program, and the crucial importance of personal messaging with the coach in times of need. Nevertheless, participants signaled the need to personalize symptom monitoring, and expand monitoring to warning signals beyond symptoms. Additionally, optional modules were suggested, including mindfulness, recovery stories, goal setting, and peer support, possibly suggested for specific warning signals.

Discussion: Steadymood seems to be used and valued, but it can be personalized and broadened to an SMP that also helps individuals to increase their functioning and quality of life, next to relapse prevention, to promote sustainable recovery.

Unlocking Potential: Assessing Physical Resilience In Older Patients Admitted To The Acute Medical Unit

Kirsten Bos (Clinical Research Centre, Rijnstate Hospital, Arnhem - Netherlands), Jurgen Claassen (Department of Geriatrics, Radboud University Medical Centre, Nijmegen - Netherlands), Frank Bosch (Department of Internal Medicine, Rijnstate hospital, Arnhem, the Netherlands - Netherlands), Carine Doggen (Clinical Research Centre, Rijnstate Hospital, Arnhem - Netherlands), Bas Bredie (Health Innovation Labs, Radboud University Medical Centre, Nijmegen - Netherlands), René Melis (Department of Geriatrics, Radboud University Medical Centre, Nijmegen - Netherlands)

Presenter: Kirsten Bos

Abstract

Background: Most patients admitted to the Acute Medical Unit (AMU) are 60 years and older, have several co-morbidities, and often are frail. During the short AMU stay, it can be challenging to determine whether these patients can recover safely at home or require a more extended hospital stay. Determining physical resilience could support clinicians in deciding between discharge or prolonged hospitalization, because recovery from an acute condition is strongly related to a person's resilience against deterioration. This research aims to evaluate the feasibility of resilience measurements in acutely ill patients 60 years and older admitted to the AMU.

Methods: A feasibility pilot study including 50 patients 60 years and older admitted to the AMU of one teaching and one university hospital, the Netherlands, was conducted. Participants completed the 'Older Persons and Informal Caregivers Survey Short Form' about their health-related quality of life and performed the standardized sit-to-stand challenge and grip work assessment in the first 48 hours of admission. Patient experience with these methods was evaluated.

Findings: Of the 50 participants, 46% could complete the sit-to-stand challenge in 12 (median; q1-q3=10-13) minutes. Participants could not complete the sit-to-stand challenge mainly due to their medical condition (25%) and technical challenges (10%). Regarding the grip work assessment, 74% of the participants completed it within 5 (median; q1-q3=4-5) minutes. Participants who could not complete the grip work assessment primarily failed to achieve 80% of the maximum grip strength. Most participants who completed the resilience measurements experienced these as doable and not burdensome. Barriers to perform the resilience measurements were a deteriorated patient condition and patients in isolation who could not be measured.

Conclusion: The grip work assessment appears feasible for older patients admitted to the AMU, whereas the sit-to-stand challenge frequently presents difficulties due to clinical conditions and technical challenges.

Factors Influencing Accessibility Of Videoconsultations For Patients With Low Digital Literacy

Wieke Bouwes (UMC Groningen - Netherlands)

Presenter: Wieke Bouwes

Abstract

Background: To cope with healthcare challenges due to an aging population and an increase in chronic diseases video consultations (VCs) between providers and patients have emerged as a promising tool. They can reduce administrative burdens for healthcare providers and offer flexible remote care. However, 1 in 5 Dutch individuals with low digital literacy encounter barriers in accessing VCs. The aim of this qualitative study is to investigate factors related to the roles of intra- and inter-organizational hospital relations, patient acceptance, and provided support in making VCs accessible for them.

Methods: This qualitative study involved thirteen semi-structured interviews with patients, healthcare practitioners, and eHealth experts. Patients with low digital literacy were observed during VC setups. The study was conducted amongst patients and healthcare providers in the UMC Groningen and a eHealth experts in the North of the Netherlands from January 2022 until July 2022.

Abstract findings: Patient acceptance emerged as a factor for VC accessibility. Lack of digital experience and voluntariness affect willingness to use VCs, while perceived benefits, such as reduced travel time, seem to foster acceptance. Adequate support, tailored to patients' learning styles influences access to VCs. Also, support alignment and technological standardization of VC systems influences accessibility.

Conclusion/Discussion: To enhance VC accessibility for patients with low digital literacy, healthcare managers can help in offering or referring to suitable support. Standardization of VC systems and inter-organizational collaboration are essential. Future research should explore alignment between support and patient learning styles, options in remote access software, and the impact of the GDPR on inter-organizational collaborations as these might influence access to VCs. Most importantly, strong intra- and inter-organizational relationships and collaboration are crucial to align support offerings with healthcare providers' systems.

Scoping Review Into Support Initiatives For Patients To Engage eHealth Inclusion

Wieke Bouwes (UMCG, Groningen - Netherlands), Nynke Scherpbier (UMCG, Groningen - Netherlands), Eveline Hage (University of Groningen, Groningen - Netherlands), Esther Metting (UMCG, Groningen - Netherlands)

Presenter: Wieke Bouwes

Abstract

Background: The utilization of eHealth, encompassing ICT tools in healthcare, offers opportunities to transfer certain responsibilities from healthcare providers to patients, enhancing self-management. For instance, individuals with diabetes can monitor their blood glucose levels at home using tele-monitoring devices, while those with COPD can gain valuable insights through regular health questionnaires. As healthcare facilities increasingly integrate eHealth solutions, there is a potential for reducing patients' healthcare utilization. However, challenges persist for patients who encounter difficulties accessing eHealth. Currently, existing support initiatives in eHealth usage are fragmented, lacking clear guidelines and integration pathways between healthcare providers and support networks. Consequently, part of the population faces barriers hindering them from receiving the benefits of eHealth. This scoping review aims to identify and evaluate existing support initiatives in eHealth, specifically focusing on their impact on patient accessibility.

Methods: Employing the PRISMA-SR guidelines and Arksey and O'Malley's framework, this study adopted a scoping review methodology. Databases searched include PubMed, Scopus, Embase, and Web of Science were systematically searched to provide a comprehensive overview of factors influencing patient access to eHealth support initiatives. Studies from 2014 onwards are included, with an emphasis on support initiatives and impact on patients eHealth inclusion. The nonadoption, abandonment, scale-up, spread, and sustainability (NASSS) framework is used to structure the findings. The seven domains included in this framework are: the condition or illness studied, the eHealth technology, value proposition, adopter system, organization(s) involved, wider context, and interaction and mutual adaptation between these domains over time. Additional categories were added based on the data-analysis.

Glance Abstract Findings: While the scoping review is ongoing, preliminary analysis underscores the positive impact of collaborative efforts between healthcare entities and library-based support on eHealth inclusion. Comprehensive findings are anticipated upon further data analysis.

Conclusion: This scoping review aims to provide insights into the landscape of support initiatives for eHealth inclusion. By identifying the interplay between healthcare providers and support initiatives and its' impact, we aim to engage collaboration between healthcare providers and support organizations to refer patients to suitable support.

Effect Of Personalization On Health Outcomes In The Slimmer Combined Lifestyle Intervention

Carlijn Braem (University of Twente, Enschede - Netherlands), Suzan Wopereis (Netherlands Organization for Applied Scientific Research (TNO), Leiden - Netherlands), Utku Yavuz (University of Twente, Enschede - Netherlands), Hermie Hermens (University of Twente, Enschede - Netherlands), Peter Veltink (University of Twente, Enschede - Netherlands)

Presenter: Carlijn Braem

Abstract

Background: A combined lifestyle intervention (CLI), like SLIMMER, targeting physical activity and diet has shown to reduce the risk of type-2 diabetes mellitus and other chronic diseases. However, sustaining healthier lifestyle behaviors poses challenges. Personalizing interventions may enhance adherence and encourage sustainable habits. This study aims to evaluate the impact of personalization components into the SLIMMER program on anthropometrics. Moreover, our study examined the relation between activity tracker parameters and anthropometric changes.

Method: In this group-randomized, controlled intervention study, 61 participants were assigned to the personalized intervention group, and 60 to the control group following the standard SLIMMER program. Participants, aged 18-70 years with overweight or obesity, were followed during the first six months of the SLIMMER program. Body composition was assessed at baseline and study end. The PhenFlex test, a mixed-meal challenge test, was conducted at baseline and study end to personalize dietary and exercise recommendations. Personalized feedback was provided using an activity tracker (Fitbit Charge 4) and weighing scale. Physical activity, heart rate, and sleep parameters were selected from the Fitbit and their association with anthropometrics changes were investigated with mixed effects models.

Findings: At six months, the intervention group showed significant improvements in body weight (-4.7 kg, $p<0.01$), body fat percentage (-3.5%, $p<0.01$), and fasting glucose compared to the control group (-2.0 kg and -1.0%). The intervention group demonstrated a significantly lower dropout rate than the control group. In the intervention group, no increase in daily step count was observed.

Conclusions: The personalized SLIMMER program showed significant improvements in body weight, BMI, and body fat percentage compared to the standard SLIMMER program. These findings highlight the potential of personalized interventions in achieving meaningful health outcomes. Further analysis of activity tracker data is necessary to identify parameters linked to anthropometric changes, enabling more personalization of the SLIMMER program.

Implementation Needs Of Experience Sampling Methodology In Paediatrics According End-Users: A Qualitative Case Study

Anna Braspenning (School of Allied Health Professions, Fontys University of Applied Sciences, Eindhoven - Netherlands), Maartje Stutvoet (Wilhelmina Children's Hospital University Medical Centre Utrecht, Utrecht University, Utrecht - Netherlands), Sanne Nijhof (Wilhelmina Children's Hospital University Medical Centre Utrecht, Utrecht University, Utrecht - Netherlands), Elise van de Putte (Wilhelmina Children's Hospital University Medical Centre Utrecht, Utrecht University, Utrecht - Netherlands), Remco Veltkamp (Department of Information and Computing Sciences, Utrecht University, Utrecht - Netherlands), Inge Bongers (Department of Tranzo, Tilburg School of Social and Behavioral Sciences, Tilburg University, Tilburg - Netherlands), Eveline Wouters (Department of Tranzo, Tilburg School of Social and Behavioral Sciences, Tilburg University, Tilburg - Netherlands)

Presenter: Anna Braspenning

Abstract

Background: One in five children with chronic health conditions experiences non specific symptoms, e.g., fatigue. This calls for transdiagnostic care, tailored for the individual. Experience Sampling Methodology (ESM) enables personalised insight into factors, preferably modifiable (i.e., lifestyle), that are associated with such symptoms. Despite its potential, no ESM-intervention has yet transitioned from research to paediatric care practice. This study assessed implementation factors from the perspective of end-users for an ESM-supported transdiagnostic blended mHealth intervention to facilitate its future implementation in paediatric care practice.

Methods: We used PROfeel as our case. PROfeel starts with smartphone-based ESM for personal fatigue insights, followed by shared decision-making on insight-based and tailored lifestyle goals together with a professional. We conducted semi-structured interviews and used inductive thematic coding for analysis. Respondents were patients (N=11), their important others (IOs, N=11) and health care professionals (HCPs, N=20). Patients, aged 13 to 21, used PROfeel in a research setting. Ten patient-parent dyads and two singletons were separately interviewed.

Findings: For patients and IOs, implementation factors could be grouped in the themes, ‘motivation’, ‘value’ and ‘self-dependence’. The severity of fatigue primarily determined the motivation for use. PROfeel often added value when patients and IOs experienced insight, effect and alignment with everyday life. Patients largely used PROfeel self-dependent and mostly saw PROfeel as something private. However, in younger patients a supportive role by IO (e.g. reminding, facilitating) was frequently seen and usually appreciated.

In HCPs we found three themes. ‘Perceived benefits experienced by patients’ were most important. ’Deployment of PROfeel’ was based on perceived scope of responsibility of the HCPs and differences in specific diagnostic groups. 'Preconditions' mentioned were efficacy, practitioner’s skills, time, and financing.

Conclusion: PROfeel is feasible for patients if aligned with the heterogeneity of paediatric care practice.

Examining The Impact Of Practical Constraints On e-Health Design Research Projects Using A Case Study

Ivo Bril-Broers (Hanze University of Applied Sciences - Netherlands), Nick Degens (HKU University of the Arts Utrecht - Netherlands), Joke Fleer (UMCG - Netherlands)

Presenter: Ivo Bril-Broers

Abstract

Background: eHealth design research projects are seldom simple. Their multidisciplinary and, ideally, participatory nature places demands on how a project should be run to meet its goal. Concurrently, their ideal to improve an actual real-world context also introduces practical constraints: stakeholders lack time and priorities can change. A design researcher needs to be pragmatic to address such constraints whilst overseeing that the project's goal is met. Striking such a balance often involves difficult decisions and consequences. This begs the question: how do we currently make those decisions, and on what basis?

Method: Through a retrospective case analysis, we examined the design trajectory of an e-health project of the first author. This project featured practical constraints such as 1). a target audience, (assistant) nurses, which was hard to involve structurally and 2). limited control on when, where, and how many of the target audience could be involved.

Findings: The analysis showed pragmatic compromises on the level of participatory practices, such as employing the use of proxies for the target audience. To maintain some direct involvement, iterations were employed to validate decisions made with the proxy. This negatively impacted the flexibility of the project, as decisions were hard to tread back on, making them more path-dependent. To address the lack of access to larger samples, space, and time we conducted small studies with a diverse set of methods. This mixed methods approach allowed us to triangulate our understanding of the problem context and move on. Although implicitly, we were managing our confidence for the contextual inquiry: did we feel confident in our understanding?

Conclusions: The analysis of practical constraints has provided examples of novel concepts and decision points that are currently underserved in our discussions within the field. Path-dependency and the strategic role of iteration within eHealth projects behooves more research.

Exploring Value Tensions Around Nutrition And The Role Of Stress In Families In Vulnerable Neighbourhoods

N. van den Brink (TU Delft, Industrial Design Engineering, Delft - Netherlands), M. Bos-de Vos (TU Delft, Industrial Design Engineering, Delft - Netherlands), N.D.M. Dinklo (Erasmus MC, Medical Ethics, Philosophy and History of Medicine, Rotterdam - Netherlands), A.J.P. Smit (Erasmus MC, Department of Pediatrics and Pediatric Surgery, Rotterdam - Netherlands), V.T. Visch (TU Delft, Industrial Design Engineering, Delft - Netherlands)

Presenter: Noa van den Brink

Abstract

Background: Young families in disadvantaged neighbourhoods face challenges in maintaining a healthy lifestyle. These include limited capacity to maintain adequate nutrition.To support healthy eating habits, several nutrition interventions were developed. However, these focus primarily on knowledge about healthy eating and ignore that parents have competing constraints and demands in addition to healthy nutrition. Constraints and demands include stress, varying food preferences, and making food choices on a budget. This limits the uptake of nutrition interventions. A promising perspective to understand how parents navigate these competing demands is value tensions. Parents may struggle to maintain healthy behaviours because values such as being prosocial to their family may be in tension with health values. This may lead parents to satisfy family taste preferences rather than focus on healthy choices. Previous research suggests that addressing families' values and priorities in interventions makes them more personally meaningful, motivating and effective. Therefore, in this paper we explore the values of parents of children aged 0-4 years and how they may be in tension regarding nutrition choices to inform design of more effective interventions.

Methods: In this study, the qualitative method contextmapping was used. The method has two parts. First, the sensitisation of participants to stimulate their awareness of their experiences, values and goals regarding nutrition in their family. To sensitize, we used preparatory exercises sent via WhatsApp. Second, semi-structured interviews were conducted to elaborate on the sensitisation exercises. The interviews explored tensions related to food, stress and the family social network. The interview data were analysed by using thematic analysis.

Findings: Initial findings show how different stressors and values of parents underlie their nutrition choices. We argue that nutrition interventions need to be personalised to take into account these different factors in order to promote healthy nutrition in families. We discuss possible directions for achieving this.

Human Centered Design In VR Research For Stroke Rehabilitation: Insights From Patients And Informal Caregivers

Loes Bulle-Smid (Windesheim University of Applied Sciences, Zwolle, Radboud University MEdical Center, Nijmegen - Netherlands), Fenne Verhoeven (Windesheim University of Applied Sciences, Zwolle - Netherlands), Bente Van Daatselaar (Windesheim University of Applied Sciences, Zwolle - Netherlands), Liese Terpstra (Windesheim University of Applied Sciences, Zwolle - Netherlands), Gido Hakvoort (Windesheim University of Applied Sciences, Zwolle - Netherlands), Marike Hettinga (Windesheim University of Applied Sciences, Zwolle - Netherlands)

Presenter: Loes Bulle-Smid

Abstract

Background: This study identifies the possibilities and challenges of involving patients and their informal caregivers in research supporting development and implementation of Virtual Reality (VR) in stroke rehabilitation. So far, this practice seems limited, although the importance of human centered design healthcare technology, and also specifically VR research for stroke rehabilitation, is demonstrated. This study aims to understand and optimize the involvement of patients and their informal caregivers in the development and application of VR in stroke rehabilitation. Informal caregivers play a crucial role in rehabilitation however, research indicates a limited inclusion of informal caregivers.

Methods: This study draws upon both a literature review and data from semi-structured interviews with five stroke patients and three informal caregivers. Applying the Vignette-method and thematic analysis, this study generated participants' attitudes regarding VR technology in rehabilitation settings and the way in they can be optimally included in this type of research.

Findings: Both patients recovering from stroke and informal caregivers express enthusiasm and eagerness in utilizing VR. Furthermore, patients perceive potential benefits in exercising independently, secure, and home-based, whereas informal caregivers appreciate the notion of having their family members more at home than in the clinic and are willing to provide support and encouragement to their relatives. It is crucial to consider the dynamic life structure of patients recovering from stroke when involving them in VR-research, necessitating a well-defined VR rehabilitation goal that accommodates both their physical and cognitive well-being. Informal caregivers, unable to offer continuous support, have their own commitments, and the patient's capacity varies from day to day.

Conclusions: Despite encountering various challenges, both stroke patients and their informal caregivers demonstrate enthusiasm towards utilization of VR to support rehabilitation. This study offers insights for involving stroke patients and informal caregivers in VR research, providing key considerations for future VR-based rehabilitation practices.

FHIR-Based Data Harmonization Pipeline For MyDigiTwin's Federated Learning Architecture

Héctor Cadavid (Netherlands eScience Center - Netherlands), Cunliang Geng (Netherlands eScience Center - Netherlands)

Presenter: Héctor Cadavid

Abstract

The MyDigiTwin project is a scientific initiative to develop a platform in which individuals can directly compare their health data with existing records that have been acquired from other studies. To this end, this project involves -among others- the training of AI models from existing large-scale cohort studies, for cardiovascular diseases identification and management.

As cohort studies contain highly sensitive data (it can potentially reveal personal identifiable information), MyDigiTwin is supported by a federated-learning architecture, where hospitals or research institutions retain control over their data while participating in the training process of AI models. Moreover, to ensure consistency and coherence, the participating entities are expected to generate a 'harmonized' version of their data to be used during the federated learning process.

In this demonstration, we will present an ETL pipeline, and a series of related tools, tailored to this harmonization problem: the transformation of cohort or longitudinal studies data into standard Dutch FHIR profile-compliant resources. The presentation is focused on the guiding qualities of this pipeline: its simplicity for integrating the expert's domain knowledge in the mapping process, its reusability across multiple heterogeneous datasets, and its efficiency, considering the mismatch between the structure of these studies datafiles, and the patient-centered one of FHIR. Additionally, we will illustrate how this pipeline is integrated within the overarching MyDigiTwin federated-learning architecture.

Mapping Decision-Making On Engagement Strategies In Digital Health Interventions: A Scoping Review

Isabella Karla Cadoni (University of Twente, Enschede - Netherlands), Sofia Bastoni (University of Twente, Enschede - Netherlands), Nienke Beerlage-De Jong (University of Twente, Enschede - Netherlands), Rúben De Freitas Gouveia (University of Twente, Enschede - Netherlands), Saskia Kelders (University of Twente, Enschede - Netherlands)

Presenter: Isabella Karla Cadoni

Abstract

Background: Recently, engagement has received increasing attention as a concept associated with the effectiveness of digital health interventions (DHIs). A dose-response relationship is often assumed: The more engaged the individual, the greater the effectiveness of the intervention. As a result, considerable work has been done to define and measure engagement and to implement strategies to promote it. However, much remains to be learned about how these strategies can be designed to promote engagement meaningfully. Therefore, this study aims to map engagement strategies by conducting a scoping review to capture the design, measurement, and rationale for using engagement strategies in digital health interventions. We will contribute with an understanding of why, when, and how design decisions are made.

Methods: This scoping review follows the Joanne Briggs Institute Reviewer's Manual and reports according to the PRISMA extension for scoping reviews (PRISMA-ScR). Five databases (Scopus, Web of Science, PsycINFO, ACM and PubMed) are searched using a combination of 'engagement', 'digital health intervention', 'strategy' and related terms. Data are extracted using Covidence, followed by title and abstract screening and full text review. Any disagreements during screening are discussed between the researchers, and in cases of disagreement, another researcher is consulted.

Expected Findings and Conclusion: The expected findings of this review are a) a list of engagement strategies with examples. The examples will include design features and measures for each strategy, and b) an overview of the rationale for adopting particular strategies. An overview of strategies can support decision-making to identify appropriate strategies to promote engagement, considering the context, such as the type of intervention and technology, as well as the target audience. The identified exemplars contribute to greater adaptability of technology and move away from one-size-fits-all approaches.

Development Of An Instrument To Measure The Relationship Between Reciprocity Behaviour And Technology Readiness

Elvira Coffetti (Hanze University Groningen - Netherlands), Wolter Paans (Hanze University Groningen - Netherlands), Wim Krijnen (Hanze University Groningen - Netherlands), Petrie Roodbol (UMCG - Netherlands), Evelyn Finnema (UMCG - Netherlands), Jelly Zuidersma (Hanze University Groningen - Netherlands)

Presenter: Elvira Coffetti

Abstract

Background: Technological innovations are often viewed as a remedy for the challenges confronting the healthcare sector, such as demographic shifts and shortages in nursing staff. However, nurses do not consistently adopt these innovations. The primary objective of this study is to design an instrument that can gauge the factors associated with nurses' readiness for technology. While numerous earlier studies concentrated on individual factors, our research uniquely emphasizes the assessment of collaborative factors. Specifically, we have integrated two key concepts: technology readiness and reciprocity behaviour. To achieve this, the Technology Readiness Index 2.0 and the Reciprocity Instrument were jointly administered, and a thorough examination of the psychometric properties of the instrument was conducted.

Methods: A cross-sectional study was conducted involving four care institutions in the northern region of the Netherlands. From October 2020 to January 2021 all Registered Nurses and Nursing Assistants employed in these institutions were provided with an anonymous link to an online survey. The survey results were analyzed using the Generalized Partial Credit Model and linear regression analyses.

Findings: The results indicate that the three subscales—technology readiness, reciprocity behavior, and the conditions of reciprocity behavior—are sufficiently reliable. The analyses affirm that the two instruments are psychometrically robust and well-suited for combination.

Conclusion: The incorporation of the Technology Readiness Index 2.0 and the Reciprocity Instrument seems a meaningful approach to assessing the correlation between reciprocity behavior and the preparedness of nursing staff to embrace technology.

Navigating The Development Of An Adaptive Digital Lifestyle Intervention For Patients: A Rapid Realist Review

Ana Coiciu (Consumption and Healthy Lifestyles chair group, Wageningen University & Research, Wageningen - Netherlands), Eline van Bennekom (Consumption and Healthy Lifestyles chair group, Wageningen University & Research, Wageningen - Netherlands), Emely de Vet (Consumption and Healthy Lifestyles chair group, Wageningen University & Research; University College Tilburg - Netherlands), Laura Winkens (Consumption and Healthy Lifestyles chair group, Wageningen University & Research, Wageningen - Netherlands)

Presenter: Ana Coiciu

Abstract

With the current technological advances in healthcare, patients are undergoing a new wave of independence and support in managing their condition. Adaptive digital interventions can contribute to personalization by intervening at the right moment during the patient's journey. Adaptive interventions are structured decision rules that translate continuous information about a patient's state and context into health recommendations. Well-developed adaptive interventions should provide guidance on how to adapt an intervention, when, and for whom it is necessary. Despite the innovative appeal, there remains a gap in understanding the development and workings behind adaptive interventions due to a lack of theoretical and contextual underpinnings. We will answer the question of how, why, for whom, and under what circumstances adaptive digital health interventions are developed for patients with metabolic syndrome.

The methodology followed a combination of stakeholder consultations and a systematic review. The first round of stakeholder consultations helped identify the scope and initial programme theories for classification. The systematic review was performed in three databases: Scopus, PsycINFO, and PubMed. Empirical articles were included if (1) they pertained to one of the three components: automation, (digital) personalization, and a time-varying or geofencing factor. The second round of stakeholder consultations will inform and consolidate the final programme theories.

The extraction and synthesis of data will be iterative. Based on the first stakeholder consultations, we identified two initial programme theories: (1) implementation factors and (2) intervention components. Per the initial program theory, we identified the context, mechanisms, and outcomes, taking into account the interaction between the technology, healthcare practitioner, and patient. Results will follow the reporting standards of the Realist and Meta-narrative Evidence Synthesis: Evolving Standards.

As part of a larger project, a realist review can help identify the contextual and theoretical grounding relevant for intervention development, contributing to an enhanced understanding of adaptive interventions.

Collaborative Frontiers: Aligning Stakeholders' Roles And Value Propositions During The Implementation Of Digital Health Environments Through Business Modeling

Aafke Coopmans (Tilburg University, Tilburg - Netherlands), Britt Bente (University of Twente, Enschede - Netherlands), Remco Mannak (Tilburg University, Tilburg - Netherlands), Nienke Beerlage - de Jong (University of Twente, Enschede - Netherlands), Eveline Wouters (Fontys, Eindhoven &Tilburg University, Tilburg - Netherlands), Ruud Verdaasdonk (University of Twente, Enschede - Netherlands), Lisette van Gemert-Pijnen (University of Twente, Enschede - Netherlands), Inge Bongers (Tilburg University, Tilburg - Netherlands)

Presenter: Aafke Coopmans

Abstract

Background: In recent years, eHealth has transformed into comprehensive digital health environments, exemplified by the Dutch "Persoonlijke Gezondheidsomgeving (PGO)." PGOs facilitate healthcare data storage, scheduling overviews, and enhanced communication between patients and healthcare professionals. The Dutch government, in collaboration with health organizations, outlined implementation goals in the "Integraal Zorg Akkoord (IZA)." Despite these efforts, practical challenges persist, rooted in legal, ethical, financial, and technological barriers, necessitating collaborative efforts among diverse stakeholders. Stakeholders, with varied backgrounds, resources, and values, contribute to successful development and implementation of digital health environments. Aligning these diverse elements is complex; the boundary-crossing theory offers a framework, emphasizing methods for reaching a shared direction. Developing a comprehensive business model collaboratively emerges as a promising method for alignment during implementation.

Goals: The workshop aims to facilitate a collaborative session where participants actively engage in discussions to collectively shape a business model for a digital health environment. Through two rounds, participants, assigned distinct stakeholder roles (e.g., software developer or health insurance company), work to align value propositions for a PGO. This participatory approach enhances the learning experience, integrating insights from the boundary-crossing theory.

Content and (interactive) activities: The workshop comprises two engaging rounds. In the first round, a select group of participants actively engages in a discussion, each embodying a distinct stakeholder role with a specific value proposition for a PGO. Simultaneously, an 'outer circle' of participants observes to understand how different value propositions influence alignment within the business model. In the second round, all participants actively join the discussion, reflecting on the business model process and examining the impact of various roles and value propositions on collaborative development. This structured approach ensures a comprehensive exploration of diverse perspectives, fostering a deep understanding of the workshop's outcomes.

You Go First: The Effects Of Self-Disclosure Reciprocity In Interactions With A Mental Health Chatbot

Emmelyn Croes (Tilburg University - Netherlands), Marjolijn Antheunis (Tilburg University - Netherlands)

Presenter: Emmelyn Croes

Abstract

Background: There is a rise in chatbots used to deliver psychological support to improve the users' mental health. Chatbots are computer-automated conversation partners designed to be non-judgmental companions for users (Croes & Antheunis, 2021). The goal of such mental health chatbots is to be a virtual companion to its users and monitor the user's mood, by guiding them in disclosing their emotions (D'Alfonso et al., 2017). Important for the effectiveness of these chatbot is the user's willingness to disclose their inner feelings (Lee et al., 2020) and that this self-disclosure is reciprocated by the chatbot (Sloan, 2010). Reciprocal self-disclosure reduces uncertainty, which can improve interpersonal trust (Huang, 2015) and perceived empathy (Skjuve et al., 2021). Therefore, in this study we examine the impact of reciprocal self-disclosure in human-chatbot communication on bonding, trust and perceived empathy towards the chatbot.

Method: A Wizard of Oz experiment with two conditions was conducted via a platform called ChatPlat. Participants (N = 86) were randomly assigned to either the condition with or without reciprocal self-disclosure. In both conditions, the chatbot asked the participants five questions to elicit self-disclosure (Sprecher et al., 2013), followed by either reciprocity or no reciprocity of self-disclosure from the chatbot. After the conversation, participants filled out a survey which measured bonding, trust, and empathy.

Findings: Our preliminary findings revealed that there was no significant difference between the conditions regarding bonding. Furthermore, people trusted the chatbot in the reciprocal self-dislcosure condition more and perceived it as more empathic, compared to the non-reciprocal self-disclosure condition.

Conclusion: We can conclude that mental health chatbots who reciprocate the users' self-disclosure elicit trust and empathy, which are both important factors in successful therapy. Thus, effective mental health chatbots need to be able to reciprocate the users' self-disclosure to enhance trust in and empathy for the chatbot.

Experiences Of Elderly And Health Professionals With Interactive Physical Activity Routes

Joan Dallinga (Centre of expertise Health Innovation, The Hague University Of Applied Sciences, Den Haag - Netherlands), Ingrid Rosbergen (Research Group Self-Management in Physical Therapy and Human Movement Care,University of Applied Sciences Leiden, Leiden - Netherlands), Katja Bel (Research Group Healthy Lifestyle in a Supporting Environment, The Hague University Of Applied Sciences, Den Haag - Netherlands), Wendy Scholtes-Bos (Research Group Healthy Lifestyle in a Supporting Environment, The Hague University Of Applied Sciences, Den Haag - Netherlands), Caroline Doorenbosch (Research Group Assistive Technology for Mobility and Sports,The Hague University Of Applied Sciences, Den Haag - Netherlands), Monique Berger (Research Group Assistive Technology for Mobility and Sports, The Hague University Of Applied Sciences, Den Haag - Netherlands), Petra Siemonsma (Research Group Self-Management in Physical Therapy and Human Movement Care,University of Applied Sciences Leiden, Leiden - Netherlands), Sanne de Vries (Research Group Healthy Lifestyle in a Supporting Environment,The Hague University Of Applied Sciences, Den Haag - Netherlands)

Presenter: Joan Dallinga

Abstract

Background: An interactive physical activity (PA) tool 'Walk in the ParQ' was implemented in an aged care and geriatric rehabilitation facility by healthcare professionals with the aim to increase PA in daily routine. This tool consists of a route where QR-codes can be scanned with a mobile application which suggests strength and balance exercises. Insight into barriers and facilitators for the tool's use are crucial for further upscaling and implementation. Therefore, the aim of this study was to collect experiences of elderly and professionals with this PA tool.

Methods: Between June and September 2023 observations and interviews were conducted in an aged care and a geriatric rehabilitation facility. Interview topics were experiences with the tool, impact on PA, and the possibility of meeting others. A focus group with healthcare professionals was organized (October 2023) to explore barriers, facilitators and supporting needs. All data was recorded, transcribed and coded.

Findings: Nine participants were observed and interviewed, 5 (M 85.4 (SD4.5)) lived in aged care and 4 stayed in a geriatric rehabilitation facility (M 68.8 (SD23.7). The tool seemed to stimulate PA and exercises were clear. Elderly living in the nursing home need the support of a professional. In some participants the tool supported socialization. Five healthcare professionals from aged care participated in the focus group. These professionals saw the potential for improving mental health and PA in elderly. However, professionals, elderly and family/relatives are not always familiar with the tool, what may hinder use. Lack of time, weather conditions and digital literacy were reported barriers as well. Professionals asked for education, communication materials and testing in practice.

Conclusion: Both elderly and healthcare professionals were positive about the PA tool. However, some barriers were experienced to implement the tool in daily use. To support implementation, education and communication materials are needed.

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Development Of SCIPP: The Self-Control Intervention App Through The CeHRes Roadmap

Tessa Dekkers (University of Twente, Enschede - Netherlands), Stephanie Schouten (University of Twente, Enschede - Netherlands), Saskia Kelders (University of Twente, Enschede - Netherlands), Nienke Beerlage-de Jong (University of Twente, Enschede - Netherlands), Geke Ludden (University of Twente, Enschede - Netherlands), Jeroen Deenik (GGz Centraal, Amersfoort - Netherlands), Yvonne Bouman (Transfore, Deventer - Netherlands), Hanneke Kip (University of Twente, Enschede - Netherlands)

Presenter: Tessa Dekkers

Abstract

Background: People with severe mental illness (SMI) often have an unhealthy lifestyle, which contributes to increased symptom severity and reduced quality of life. Sufficient self-control could help inhibit negative affective and habitual influences on health behaviour, and in turn, support the adoption of a healthier lifestyle. This study used participatory and generative design to explore the perspectives of people with SMI on self-control training, to ultimately design a usable, engaging, and effective digital self-control training app, specifically for people with SMI.

Methods: Several methods of the updated Roadmap have been used. These include desk research, 3 generative design workshops involving 6 patients and care providers with lived experience, and a think-aloud usability test involving 3 patients. Themes regarding self-control training were constructed through reflexive thematic analysis and translated into requirements regarding user experience and usability.

Findings: Participants conceptualized self-control as a gradual process of trial and error (theme 1), that is useful for a broad range of goals (theme 2), on which they wanted to collaborate (theme 3). In terms of usability, participants preferred a flat, minimalistic design with reduced textual and numerical information supported by visualizations (theme 4).

Conclusion: Participatory and generative design provides a novel way to collaborate with stakeholders on the development of eHealth interventions. This concrete approach may be specifically helpful when collaborating with vulnerable populations of different cognitive capabilities and literacy levels, including people with SMI. However, it also requires researchers to pay attention to equal distribution of roles, responsibilities, power, and benefits for all parties involved.

Travel Burden For Patients With Multimorbidity – Proof Of Concept Study In A Dutch Tertiary Care Center

Hidde Dijkstra (UMCG - Netherlands), Liann I. Weil (UMCG - Netherlands), Sylvia de Boer (University of Groningen - Netherlands), Hubertus P. T. D. Merx (University of Groningen - Netherlands), Job N. Doornberg (UMCG - Netherlands), Barbara C. van Munster (UMCG - Netherlands)

Presenter: Hidde Dijkstra

Abstract

Background: To explore travel burden in patients with multimorbidity and analyze patients with high travel burden, to stimulate actions towards adequate access and (remote) care coordination.

Methods: Electronic health record data of all patients who visited our academic hospital in 2017 were used. Patients with a valid 4-digit postal-code, aged ≥18 years, had >1 chronic or oncological condition and had >1 outpatient visits with >1 specialties were included. Travel burden was calculated as: travel time in hours * number of outpatient visit days per patient in one year * 2. Patients were stratified by the median travel burden. The contribution of travel time and the number of outpatient clinic visits days to the travel burden was examined with binary logistic regression. National maps exploring the geographic variation of multimorbidity and travel burden were built. Maps showing the distribution of socio-economic status (SES) and proportion of older age (≥65 years) of the general population were built.

Findings: A total of 14,476 patients were included (54.4% female, mean age 57.3 years (± 16.6)). Patients travelled an average of 0.42 (± 0.33) hours to the hospital per (one-way) visit with a median travel burden of 3.19 hours/year (IQR 1.68 – 6.20). High travel time showed a higher OR (578) than having high number of outpatient clinic visit days (OR = 237) to having a high travel burden. The geographic distribution of patients with multimorbidity, travel burden, SES and the proportion of older age varied.

Conclusion: The geographic representation of patients with multimorbidity and their travel burden varied but coincided locally with lower SES and older age in the general population. Future studies should aim on identifying patients with high travel burden and low SES.

A Priori Theory Approach To Conceptualizing Engagement With Digital Mental Health Interventions

Kerem Dogan (Section of Psychology, Health & Technology, University of Twente, Enschede - Netherlands), Saskia Kelders (Section of Psychology, Health & Technology, University of Twente, Enschede - Netherlands), Hanneke Kip (Section of Psychology, Health & Technology, University of Twente, Enschede - Netherlands), Iris ten Klooster (Section of Psychology, Health & Technology, University of Twente, Enschede - Netherlands), Maryam Amir Haeri (Section of Cognition, Data & Education, University of Twente, Enschede - Netherlands)

Presenter: Kerem Dogan

Abstract

Background: Digital Mental Health Interventions (DMHIs) show different levels of effectiveness for different people. A construct that can explain these differences is engagement. Engagement is traditionally referred to as users' behavioral, cognitive, and affective investment. Even though a holistic, dynamic, and contextual nature of engagement has been suggested, most research measures it as a monodisciplinary, narrow, and static construct. Moreover, most engagement frameworks within eHealth are often constructed by adopting variables and relationships from different fields without establishing a prior theoretical foundation. This theoretical disconnectedness can be the reason for conceptual and methodological confusion. This study aims to conceptualize engagement based on interdisciplinary theories.

Method: The study followed an a priori theory approach analyzing Postphenomenology, Social Practice Theory, and Social Cognitive Theory. These theories were chosen because they reflect engagement's holistic, dynamic, and contextual nature. Based on the analysis and integration of these theories, we crafted the first version of a conceptual framework for engagement with DMHIs.

Findings: The novel conceptual framework offers a process-based perspective to engagement with DMHIs by distinguishing different types of engagement: engagement states, modes, and processes. Engagement states represent different combinations of behavioral, cognitive, and affective engagement, while modes describe the specific ways individuals engage with these interventions. Engagement states and modes shape the engagement process people experience with DMHIs.

Conclusion: The novel framework shows the multifaceted structure of engagement with DMHIs and calls for more nuanced methods and measures to identify different engagement states and modes. These states and modes appear as building blocks of the engagement process, and they can help us uncover the patterns of different engagement processes. The framework addresses the need for a more dynamic, holistic, and contextual conceptualization of engagement and provides future directions for a clearer understanding of engagement with DMHIs.

Wearable Breathing Trainer: A Wearable To Support Children With Dysfunctional Breathing

Richard Evering (Saxion University of Applied Sciences, Research Group Technology, Health and Care, Enschede - Netherlands), Leonie Bouwmeester (Saxion University of Applied Sciences, Research Group Technology, Health and Care, Enschede - Netherlands), Melissa van Schaik (Saxion University of Applied Sciences, Research Group Sustainable & Functional Textiles, Enschede - Netherlands), Sarah Pichon (Saxion University of Applied Sciences, Research Group Sustainable & Functional Textiles, Enschede - Netherlands), Marjolein den Ouden (Saxion University of Applied Sciences, Research Group Technology, Health and Care, Enschede - Netherlands), Hellen van Rees (Saxion University of Applied Sciences, Research Group Sustainable & Functional Textiles, Enschede - Netherlands)

Presenter: Richard Evering

Abstract

Background: Dysfunctional breathing is a common condition in children impacting their overall well-being. Irregular breathing patterns are associated with stress-related complaints and often lead to intermittent and chronic complaints. Diagnosis involves an exercise challenge test and spirometry at the hospital. Once diagnosed, children are referred to a pediatric physiotherapist for breathing retraining. During the initial assessment, pediatric physiotherapist identify key indicators of dysfunctional breathing (e.g. superficial breathing, periodic sighing, and predominant chest breathing).

Treatment goals focus on independent identification and modification of incorrect breathing, specified to each child's complaints. This includes achieving predominant abdominal breathing, reducing superficial breathing, and adjusting breathing frequency through various exercises. Pediatric physiotherapists provide verbal instructions and, when needed, apply gentle pressure to the abdomen to promote abdominal breathing.

Complementing in-clinic interventions, children are assigned home breathing exercises, often perceived as dull. As these exercises occur outside the physiotherapists' view, tracking patient progress and exercise engagement is challenging. The Wearable Breathing Trainer (WBT) can support home treatment by monitoring breathing through a sensor placed at the thorax and the abdomen in combination with haptic stimulation for creating effective breathing exercises.

Description: The WBT includes the use of respiratory inductance plethysmography (RIP) for measuring the movement of both thorax and abdomen independently. Furthermore, the WBT follows the breathing pattern of the child, which means that it provides haptic stimulation based on the incoming sensor/breathing data. The goal of the haptic exercises is to guide and promote the child to breathe steadily towards the abdomen.

Practical description of the demonstration: The demonstration includes a presentation of what the WBT is; a vest with RIP sensors and vibrotactile stimulation and a laptop showing the visualization of real-time sensor data. Researchers will be demonstrating how it works by applying a working prototype to a test subject.

Exploring Emotions In Virtual Reality: A Physiological Approach

Laura Feliziani (BMS Lab, University of Twente, Enschede, Netherlands. Politecnico di Milano, Milano, Italia - Italy), Noemi Manzo (BMS Lab, University of Twente, Enschede, Netherlands. Politecnico di Milano, Milano, Italia - Italy), Jan-Willem van t Klooster (BMS Lab, University of Twente, Enschede, Netherlands - Netherlands), Enrico Gianluca Caiani (Electronics, Information and Bioengineering Dpt., Politecnico di Milano, 20133 Milano, Italy. IRCCS Istituto Auxologico - Italy), Emanuele Tauro (Electronics, Information and Bioengineering Dpt., Politecnico di Milano, 20133 Milano, Italy. IRCCS Istituto Auxologico - Italy)

Presenter: Laura Feliziani & Noemi Manzo

Abstract

Background: The integration of Virtual Reality technology in healthcare enables the creation of safe and controlled environments for tests and exploration. It opens research possibilities in novel areas, such as the assessment of specifically elicited emotions through measurement of physiological parameters. The aim of this research is to explore whether immersive VR scenarios could successfully elicit specific emotional experiences, detectable through quantitative physiological changes.

Methods: Five interactive virtual scenarios were developed using Unity: four tailored to evoke an emotion among fear, disgust, happiness, and sadness, and one neutral as a baseline. 61 participants (34 M, 26 F, 1 O) underwent a 7-minute evaluation for each scenario, with a 2-minute baseline intermission between scenarios. Blood pressure, heart rate, and skin galvanic response were continuously acquired via FinaPres and EmbracePlus medical devices. At the end of the experiment, participants filled a questionnaire on the overall experience. Wilcoxon statistical analysis of collected data targeted at identifying physiological variations correlated to potentially experienced emotions.

Findings: The analysis revealed a trend of increase in the physiological parameters during emotional scenarios compared to baseline values. Significance was observed for emotions expected to yield a physiological increase ($p_{valuefear,HR} = 4{,}104e\text{-}09$). By investigating the relationship among emotional scenarios, the fear scenario was identified as the most impactful ($p_{valuefear\text{-}sadness,GSR} = 0{,}017$). Similarly, the questionnaire analysis revealed high levels of immersion and engagement among participants. Correlation analysis revealed significance between survey emotion scores and certain physiological trends ($corr_{Spearmandisgust,MAP} = -0{,}3440$).

Discussion: The results underscore the efficacy of the designed VR scenarios in eliciting emotional responses, as supported by both physiological trends and survey analysis, even though they also suggest a similar impact on physiological changes from diverse emotions. The developed VR immersive scenarios have proven their efficacy as a controlled environment, enabling the predictable elicitation of physiological responses.

NeuroEPITool – A Research Digital Tool To Ascertain Neurological Outcomes In Population-Based Studies By A Non-Expert

Vasco Ferreira (University Of Groningen Campus Fryslân - Netherlands), Esther Metting (University Medical Center Groningen - Netherlands), Valentina Gallo (University Of Groningen Campus Fryslân - Netherlands)

Presenter: Vasco Ferreira

Abstract

Background: Epidemiologists studying neurological diseases often face struggles such as a lack of resources (e.g., personnel and equipment) to properly capture signs and symptoms of neurological diseases within the research environment. eHealth is suggested as an alternative to guide the researcher through a neurological examination and perform it in a low-resource context. We aimed to develop an eHealth research tool that can detect neurological signs and symptoms and be used by a non-neurologist.

Methods: A systematic review (SR) to capture eHealth assessing neurological impairment was conducted to set the grounds for conceptualisation. A subsequent Delphi study was performed in preparation for tool development, to identify the minimum neurological tests that can rule out the most impairment. The decision tree for the tool is currently being built together with neurologists, epidemiologists and IT experts. After development, two validations are currently planned; one that assesses inter-rater reliability, and a further validation in a cohort study.

Findings: 42 eHealth tools were captured in the SR, most being limited to assessing a narrow range of signs and symptoms of neurological diseases; approximately half disregarded proper maintenance strategies and have since been discontinued. The Delphi study achieved consensus on 10 neurological tests and 7 anamnestic questions to be implemented into the tool. Consensus items were then connected into a decision tree. If tests are negative, impairment is ruled out; when positive, further tests need to be administered to explore potential outcomes. The tool is presently being developed through feedback loops between health and IT experts, and the general tool concept and the steps taken until now will be described at the conference.

Conclusion: The described tool may be promising in aiding epidemiological research, by ascertaining neurological outcomes in population-based studies. Future work entails finalising tool development and properly validating it in the field.

Exploring The Impact Of The Capable eHealth Intervention On HRQol In Melanoma Patients Undergoing Immunotherapy: A Prospective Pilot Study

Itske Fraterman (Netherlands Cancer Institute - Netherlands), Lucia Sacchi (University of Pavia - Italy), Henk Mallo (Antoni van Leeuwenhoek - Netherlands), Valentina Tibollo (Istituti Clinici Scientifici Maugeri SpA SB IRCCS - Italy), Savannah Glaser (Amsterdam UMC - University of Amsterdam - Netherlands), Stephanie Medlock (Amsterdam UMC - University of Amsterdam - Netherlands), Ronald Cornet (Amsterdam UMC - University of Amsterdam - Netherlands), Matteo Gabetta (BIOMERIS SRL - Italy), Vitali Hisko (BITSENS JSC - Lithuania), Vadzim Khodakou (BITSENS JSC - Lithuania), Ella Barkan (IBM Research - Israel), Laura del Campo (Associazione Italiana Malati di Cancro - Italy), David Glasspool (Deontics Ltd - United Kingdom), Alexandra Kogan (University of Haifa - Israel), Giordano Lanzola (University of Pavia - Italy), Roy Leizer (University of Haifa - Israel), Manuel Ottaviano (Universidad Politécnica de Madrid - Spain), Mor Peleg (University of Haifa - Israel), Konrad Sniatala (Poznan University of Technology - Poland), Szymon Wilk (Poznan University of Technology - Poland), Enea Parimbelli (University of Pavia - Italy), Aneta Lisowska (Poznan University of Technology - Poland), Silvana Quaglini (University of Pavia - Italy), Mimma Rizzo (Azienda Ospedaliero Universitaria Consorziale Policlinico di Bari - Italy), Laura Locati (Istituti Clinici Scientifici Maugeri SpA SB IRCCS - Italy), Annelies Boekhout (Netherlands Cancer Institute - Netherlands), Lonneke van de Poll-Franse (Netherlands Cancer Institute - Netherlands), Sofie Wilgenhof (Antoni van Leeuwenhoek - Netherlands)

Presenter: Itske Fraterman

Abstract

Background: Patients with melanoma undergoing therapy with immune-checkpoint inhibitors (ICIs) often experience immune-related adverse events (AEs), cancer-related fatigue and emotional distress, affecting health-related quality of life (HRQoL) and clinical outcomes of immunotherapy. EHealth tools can aid cancer patients addressing issues such as AEs and psychosocial well-being from various perspectives. We explored the effect of the CAPABLE mobile application on HRQoL compared to a matched historical control group receiving standard care, as well as feasibility endpoints.

Methods: This prospective pilot study compared an exploratory cohort that received the CAPABLE smartphone app and a multisensory smartwatch for 6 months (intervention) to a 2:1 individually matched historical prospective control group that did not receive the app or smartwatch. CAPABLE is an extensively tested eHealth application, including educational material, remote symptom monitoring, and well-being interventions. HRQoL data was measured with the EORTC QLQ-C30 at baseline, 3, and 6 months after start of treatment. Mixed effects linear regression models were used to compare HRQoL between the two groups over time.

Findings: From eligible intervention patients (n=59), 31 (53%) signed informed consent to participate. Intervention and control group were equally balanced on clinical characteristics. Baseline HRQoL scores were on average 10 points higher in the intervention group. When correcting for sex, age, tumor stage, time and baseline scores, no significant nor clinically

relevant differences between the intervention group and controls were found in any of the HRQoL domains over time.

Conclusion: No significant differences in HRQoL scores were found between CAPABLE users and matched controls. However, sample size of this pilot study was low and ceiling effects might have played a pivotal role. When aiming at personalized patient and survivorship care, we need to be aware that eHealth tools might not be the future for all patients, especially in patients with melanoma starting ICIs.

Prototyping A System For Measuring Stress In People With Stress-Related Complaints Using A Transdisciplinary Approach

Evelien van de Garde-Perik (Fontys University of Applied Sciences, Information & Communication Technology, Eindhoven - Netherlands), Nico Kuijpers (Fontys University of Applied Sciences, Information & Communication Technology, Eindhoven - Netherlands), Jacco Snoeren (Fontys University of Applied Sciences, Information & Communication Technology, Eindhoven - Netherlands), Leoni van Dijk (Fontys University of Applied Sciences, Allied Health Professions, Eindhoven - Netherlands), Ittay Mannheim (Fontys University of Applied Sciences, Allied Health Professions, Eindhoven - Netherlands), Petra Heck (Fontys University of Applied Sciences, Information & Communication Technology, Eindhoven - Netherlands), Noortje Lavrijssen (Fontys University of Applied Sciences, University of Law Avans-Fontys, Tilburg - Netherlands), Gerard Schouten (Fontys University of Applied Sciences, Information & Communication Technology, Eindhoven - Netherlands), Eveline J.M. Wouters (Fontys University of Applied Sciences, Allied Health Professions, Eindhoven - Netherlands), Els van Westrienen (Fontys University of Applied Sciences, Allied Health Professions, Eindhoven - Netherlands), Manon W.H. Peeters (Fontys University of Applied Sciences, Allied Health Professions, Eindhoven - Netherlands)

Presenter: Evelien van de Garde-Perik

Abstract

Background: Measuring and monitoring stress has potential benefits for care and self-management for people with stress-related complaints. Early identification and monitoring of stress can be beneficial for various health conditions. Several studies have found that skin conductance and heart activity can be used as a proxy for stress. Measuring these physiological parameters using wearable sensors, might be helpful to identify (de)stressors and consequently, a psychosocial treatment approach. Therefore, wearables are promising as supportive technology for care of people with stress-related complaints, such as in dementia or physical persistent symptoms (PPS). However, stakeholders like(in)formal caregivers indicate that current available (wearable) systems to measure stress are not fit for purpose within the care as usual. In addition, due to legislation, not all systems are allowed.

Concept: Research through collaborative effort with a diverse group of stakeholders has led to a prototype addressing these barriers. A community of stakeholders has been included in the design and development of the prototype. By integrating their perspectives and requirements, we have developed a prototype that is not only technically viable but also aligns more closely with the practical needs of care. To this end, needs, requirements and evaluations of people with dementia, PPS, (in)formal caregivers, legal- and IT-experts, have been collected. This resulted in using off-the-shelf hardware combined with in-house developed software for appropriate stress visualisations based on wearable sensor data, suitable for care as usual.

Demonstration: This prototype, developed from our transdisciplinary approach, showcases a solution that is more 'fit for purpose' for the care of individuals with stress-related

complaints. Next to our own prototype, we will demonstrate an off-the-shelf solution for measuring stress. Implications for research, the care and self-management of people with dementia or PPS will be discussed.

How To Develop Prediction Models In Case Of Only A Few Events?

Sjoerd Garssen (University of Twente, Rijnstate, Philips - Netherlands), Carine Doggen (University of Twente, Rijnstate - Netherlands), Bernard Veldkamp (University of Twente - Netherlands), Wim Verhaegh (Philips - Netherlands), Sandra Oude Wesselink (University of Twente - Netherlands)

Presenter: Sjoerd Garssen

Abstract

Introduction: Prediction models based on machine learning are frequently used in healthcare research and practice. Commonly, these models try to find distinctive properties in the data to separate one group of patients from another group (e.g., deteriorating from non-deteriorating patients). To find distinctions in the data when training a model, such as Logistic Regression or Random Forest, both groups should be represented sufficiently. If one group has a low number of patients (e.g., only a few patients experienced an event), developing such models is challenging. Also, it may be difficult to find complex patterns in the data that distinguish both groups. Therefore, we aim to investigate solutions for machine learning based prediction models when only a few events occurred.

Methods: We searched for machine learning algorithms that do not heavily rely on a few patients who experienced an event. Furthermore, we would like to illustrate our first analyses of the potential solutions using wearable sensor data from a randomized controlled trial. In this trial, 200 patients in an Acute Medical Unit received a wearable sensor for 14 days, but only five patients deteriorated at home while wearing the sensor.

Findings: One-class classification, also known as anomaly detection, may be a useful technique. It trains a prediction model on only one group of patients, which represent the norm. When a new patient is predicted to deviate from this norm, the patient is considered abnormal. We would like to discuss the (dis)advantages of this technique using our first analyses. In the perfect case, all deteriorated patients will be predicted to be abnormal, whereas non-deteriorating patients will be predicted as normal.

Conclusion: One-class classification may offer an alternative for classical machine learning techniques when having data scarcity for one group of patients, as shown by our first analyses.

Predicting Whether Patients Are Physiologically Fit For Discharge Using Machine Learning With Hospital Data

Sjoerd Garssen (University of Twente, Rijnstate, Philips - Netherlands), Carlijn Vernooij (Philips - Netherlands), Niels Kant (University of Twente, Rijnstate - Netherlands), Mark Koning (Rijnstate - Netherlands), Frank Bosch (Radboudumc, Rijnstate - Netherlands), Carine Doggen (University of Twente, Rijnstate - Netherlands), Bernard Veldkamp (University of Twente - Netherlands), Wim Verhaegh (Philips - Netherlands), Sandra Oude Wesselink (University of Twente - Netherlands)

Presenter: Sjoerd Garssen

Abstract

Introduction: Acute medical units provide acute care during the initial 24-72 hours of a patient's hospital admission. During this stay, physicians decide to discharge a patient or to keep the patient in the hospital. Incorrectly deciding to not discharge a patient results in a discharge delay and contributes to hospital overcrowding. The discharge decision-making depends on a patient's physiological condition. Also, the decision-making is up to the physician who makes such decision, possibly giving subjectivity. Improving the decision-making may reduce discharge delays. Therefore, we aimed to prove the concept of predicting whether patients are physiologically fit-for-discharge using machine learning with hospital data. Additionally, we investigated if predictions of physiological discharge fitness could aid in discharging patients earlier and which variables were most important.

Methods: Logistic Regression and Random Forest models were constructed to predict every hour whether patients were physiologically fit-for-discharge. Data were extracted from electronic medical records of patients who were admitted to an acute medical unit of a Dutch hospital (N=199). Only commonly available data were used, avoiding the requirement of additional data collection.

Findings: Although Random Forest outperformed Logistic Regression, both could reasonably predict physiological discharge fitness. Different classification thresholds with corresponding trade-offs between sensitivity and specificity may be chosen depending on the bed occupancy. Most patients who were correctly predicted to be fit-for-discharge, were predicted correctly already 12 or 24 hours before actual discharge. Considering a median length of stay in the acute medical unit of 24.3 hours (IQR: 17.1 – 47.1), this may aid to reduce discharge delays significantly. Patient characteristics, vital signs and laboratory results were important predictors.

Conclusion: This study proved the concept of predicting whether patients in an acute medical unit are fit-for-discharge using machine learning and commonly available hospital data. This may be used in the discharge decision-making to reduce discharge delays.

Required Competences Of Nurses Working With Artificial Intelligence-Based Lifestyle Monitoring In Long-Term Care.

Sjors Groeneveld (Research Group Technology, Health & Care, School of Social Work, Saxion University of Applied Sciences, Enschede - Netherlands), Harmieke van Os-Medendorp (Research Group Smart Health, School of Health, Saxion University of Applied Sciences, Deventer/Enschede - Netherlands), Lisette van Gemert-Pijnen (Centre for eHealth and Wellbeing Research, Section of Psychology, Health and Technology, University of Twente, Enschede - Netherlands), Rudolf Verdaasdonk (TechMed Center, Health Technology Implementation, University of Twente, Enschede - Netherlands), Thijs van Houwelingen (Research Group Technology for Healthcare Innovations, University of Applied Sciences Utrecht, Utrecht - Netherlands), Marjolein den Ouden (Research Group Technology, Health & Care, School of Social Work, Saxion University of Applied Sciences, Enschede - Netherlands)

Presenter: Sjors Groeneveld

Abstract

Background: As more and more older adults prefer to stay in their homes as they age, there's a need for technology that supports this. A relevant technology is Artificial Intelligence (AI)-based lifestyle monitoring, utilizing data from sensors placed in the home. This technology is not, and cannot be, a replacement for nurses, but rather could act as a support tool. Therefore it is needed to identify the required competences of nurses to do so. The aim of this study is to reach consensus on the competences of nurses to work with AI-based lifestyle monitoring in long-term care.

Methods: From March through September 2023 a three round modified Delphi study was conducted. 48 experts participated in the study: nurses, innovators, developers, researchers, managers and educators. Based on literature, a list of 64 proposed competences was developed, with the opportunity to provide suggestions for adjustments or inclusion of new competences. In the first two rounds experts assessed clarity and relevance through an online questionnaire, the threshold to reach consensus was 80%. In the third round the items without consensus were bespoken in a focus group setting to decide their inclusion in the final list.

Findings: After the first round consensus was reached on relevance and clarity on 72% of the competences, after the second round on 83% of the competences. The inclusion of the remaining competences was qualitatively discussed in a focus group setting. The final list consists of 61 competences, divided into 10 domains: Basic, Develop, Indicate, Personalize, Register, Interpret, Integrate, Communicate, Implement, Evaluate. Discussion remains on the applicability for specific levels of education and expertise.

Conclusions: Consensus was reached on a list of required competences of nurses working with AI-based lifestyle monitoring in long-term care. These competences can serve as starting point for the development of future-proof health education.

Development And Outcomes Of A Pilot Trial Of Companion, An Internet-Based Mindfulness-Based Couple Intervention Targeting Cancer-Related Fatigue

Mariët Hagedoorn (UMCG - Netherlands), Sophie van Dongen (Helen Dowling Institute - Netherlands), Fabiola Müller (Amsterdam UMC - Netherlands), Rosalie van Woezik (Helen Dowling Institute - Netherlands), Marije van der Lee (Helen Dowling Institute - Netherlands)

Presenter: Mariët Hagedoorn

Abstract

Background: Chronic Cancer-Related Fatigue (CCRF) is a common symptom among cancer survivors. We adapted a currently available individual internet-based mindfulness-based cognitive intervention (eMBCT) to fit the needs of couples, as evidence suggests that targeting the couple and patient-partner relationship might be more beneficial than targeting the patient alone.

Methods: We started with a qualitative and quantitative needs assessment among survivors, partners and psychotherapists. The results were used to co-design a couple version of the existing eMBCT, which is tested in a single-arm pilot trial. The focus of the trial is on the acceptability of the couple eMBCT, potential effectiveness on patient fatigue, feasibility of trial procedures and working mechanisms. We included 24 couples that were allocated to the web-based couple intervention that consists of psycho-education, mindfulness, and cognitive-behavioural exercises. Patients and partners completed questionnaires before starting the intervention (T0), 2 weeks after completing the intervention (T1), and 1 month after T1 (T2). They also filled out weekly diaries during the intervention period. Data collection is completed by March 1, 2024.

Findings: The pilot trial is expected to support the acceptability of the intervention in terms of adherence and satisfaction with the dyadic approach and the intervention overall. We hope to see indications that the involvement of a partner in psycho-education, mindfulness, and cognitive-behavioural exercises may help reduce fatigue in patients. Results will be available by May 2024.

Conclusion: This pilot trial tests the first web-based mindfulness-based cognitive therapy for couples targeting chronic cancer-related fatigue. Findings will indicate whether proceeding with a randomized controlled trial is warranted.

Predicting Care Intensity With Routinely Collected Pre-Intake Data In Psychiatric Outpatient Care

Moritz Hausmann (UMCG, Groningen - Netherlands), Sanne Booij (UMCG, Groningen - Netherlands), Harriëtte Riese (UMCG, Groningen - Netherlands), Ellen Visser (UMCG, Groningen - Netherlands), Robert Schoevers (UMCG, Groningen - Netherlands)

Presenter: Moritz Hausmann

Abstract

Background: Psychiatric nosology faces inherent limitations in predicting patient outcomes, such as prognosis or care intensity. Clinical prediction models are trained on large datasets and can offer meaningful predictions for clinicians, patients, and healthcare administrators. We aim to examine which patient characteristics are most predictive of care intensity, assess the accuracy of predictions, and evaluate whether non-linear models enhance prediction accuracy.

Methods: This prognostic study uses routinely collected clinical data between 2014 and 2018 from electronic health records of a large academic psychiatry centre. Our transdiagnostic sample (n=1392, 52.16% women, M=35.81 years (SD=13.50)) consists of psychiatric patients who received outpatient care. The main outcome is the intensity of care in the first year after intake defined as the total time of all treatment activities (Ttreatment in hours). Pre-intake routinely collected data on sociodemographic, clinical, and functioning variables, as well as diagnostic information were used as predictors.

Results: Lasso regression and a random forest were trained to predict Ttreatment (M=43.56 hours, range 0.83-327.58). Relevant predictors ranged from patients' psychiatric history to specific disabilities in daily life. Cross-validation showed that lasso regression explained 13.76% (95% CI 11.51%-16.01%) and the random forest 19.39% (95% CI 15.72%-23.07%) of the variation in Ttreatment. When categorising Ttreatment into low and high care intensity categories, the models had an area under the ROC curve of 0.74 (95% CI 0.71-0.77) and 0.75 (95% CI 0.71-0.78), respectively.

Conclusions: The study confirms the large variability in predictors for care intensity and the modest prediction accuracy of prior studies. A non-linear statistical model did not necessarily enhance accuracy. Nonetheless, we conclude that predicting care intensity with routinely collected pre-intake questionnaires in a naturalistic setting is feasible and can potentially be improved if questionnaires are deliberately selected for that goal.

Interpretation Of Medical Machine Learning Models Should Be Based On Clinical Impact

Paul Hiemstra (Windesheim University of Applied Sciences, research group IT Innovations in Healthcare, Zwolle, the Netherlands - Netherlands), Gido Hakvoort (Windesheim University of Applied Sciences, research group IT Innovations in Healthcare, Zwolle, the Netherlands - Netherlands), Marike Hettinga (Windesheim University of Applied Sciences, research group IT Innovations in Healthcare, Zwolle, the Netherlands - Netherlands)

Presenter: Paul Hiemstra

Abstract

Background: Assessing the clinical performance of a machine learning (ML) model is crucial: for example, is our model successful at predicting which patients should undergo a prostate biopsy or not? A naïve statistical metric in a clinical context is accuracy, which assumes that every error we make is equally impactful. This is obviously not the case: an unnecessary biopsy is much less impactful than missing a very aggressive type of cancer leading to the death of a patient. Accuracy thus ignores the medical benefit or cost of a particular clinical decision we make based on the ML model. In our demonstration we want to explore a clinically oriented way to interpret statistical models, Decision Curve Analysis, for a concrete case involving which patients should receive a prostate biopsy or not.

Description of Decision Curve Analysis: Decision curve analysis uses a clinically oriented metric called net benefit. The net benefit is calculated as a weighted sum of the fraction of successfully detected prostate cancers (True Positive, sensitivity) and the fraction of unneeded prostate biopsies (False Positive, 1 – specificity). In this case, detecting cancer is more clinically impactful, how much more boils down to how many unnecessary biopsies we are willing to accept. The titular decision curve relates to the line drawn in an ”acceptable-unnecessary-biopsies” versus “net benefit” space and can serve as the focal point of a discussion with medical professionals.

The demonstration: The goal of the demonstration is to show a DCA example using the prostate biopsy case. We will go more deeply into the details of how DCA works, demonstrate how it to relates to a more classical interpretation, how to perform the analysis in Python, and how to interpret the results. Participants who have Python installed can follow along on their own machines.

Dynamically Tailored eHealth Interventions For A Healthy Lifestyle In People With Chronic Diseases: Systematic Review

Eclaire Hietbrink (University of Twente, Enschede; Ziekenhuisgroep Twente, Almelo - Netherlands), Anouk Middelweerd (University of Twente, Enschede - Netherlands), Chiara Lansink (University of Twente, Enschede; Ziekenhuisgroep Twente, Almelo - Netherlands), Wendy Oude Nijeweme (University of Twente, Enschede - Netherlands), Goos Laverman (University of Twente, Enschede; Ziekenhuisgroep Twente, Almelo - Netherlands), Miriam Vollenbroek-Hutten (University of Twente, Enschede; Medisch Spectrum Twente, Enschede - Netherlands), Monique Tabak (University of Twente, Enschede - Netherlands)

Presenter: Eclaire Hietbrink

Abstract

Background: Chronic diseases demand effective interventions to promote healthy lifestyles. This systematic review examines dynamically tailored eHealth interventions targeting physical activity and nutrition in individuals with chronic diseases. Key research questions are focused on: insight into the operationalization of tailored intervention components, objectives, target groups, behavior change theories applied, delivery methods, and results of (formative) evaluation studies.

Methods: This systematic review includes primary studies of any design, examining adults with chronic disease risk factors or specific conditions, including type 2 diabetes mellitus, chronic obstructive pulmonary disease (COPD), lifestyle-related cardiovascular disease, metabolic syndrome, hypercholesterolemia, hypertension, prediabetes/insulin resistance, overweight, or obesity. Criteria include studies reporting on dynamically computer-tailored eHealth interventions to improve physical activity or diet behaviors. A dynamically tailored intervention is defined as an intervention in which the content, amount or timing of the behavioral support is tailored based on input obtained through repeated assessments of intervention variables over time. We searched the databases PubMed, Scopus, Web of Science, PsycINFO and ACM Digital Library. Outcomes include dynamic tailoring features, development frameworks, behavior change strategies, delivery methods, and results of evaluation studies (e.g., feasibility, uptake, effectiveness). The mHealth Evidence Reporting and Assessment checklist will be used to assess the quality of intervention descriptions. Data will be synthesized narratively.

Findings: A total of 2896 titles and abstracts were screened, with 366 full-text papers scheduled for assessment. The full-text screening is ongoing. Results are anticipated in May 2024.

Conclusion: This ongoing systematic review provides an overview of the current state of the art of dynamically tailored eHealth interventions in the context of chronic diseases. Results will guide future interventions tailored for lifestyle-related chronic disease management.

An Overview And Comparison Of eHealth Lifestyle Interventions For Preschool Children: A Scoping Review

Lea Hohendorf (University of Twente, Enschede - Netherlands), Tessa Dekkers (University of Twente, Enschede - Netherlands), Hanneke Kip (University of Twente, Enschede - Netherlands), Laurence Alpay (University of applied sciences InHolland, Haarlem - Netherlands), Saskia Kelders (University of Twente, Enschede - Netherlands)

Presenter: Lea Hohendorf

Abstract

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Background: Many unhealthy habits such as physical inactivity or unhealthy snacking develop in the early phases of children's lives under the age of 5, which can set them on a path to overall poorer health later in life. This affects children from families with a low socioeconomic status (SES) even more and so far, this group has often been excluded in research and intervention development. eHealth interventions such as mobile apps can be promising solutions to promote healthier lifestyles. However, the target group and the context of their lives need to be investigated and considered. First, this review aims to identify and map working mechanisms of eHealth lifestyle interventions for children aged 0-5. Second, a comparison is made between interventions for the general and low SES populations on effectiveness, behaviour change techniques (BCTs), persuasive features, channel of technology, and type of delivery environment.

Methods: This scoping review is based on the Joanna Briggs Institute framework. Five databases were systematically searched with the key constructs eHealth, lifestyle intervention, and pre-school-aged children/parents/family. Intervention aim, target group, effectiveness, BCTs, strategy and channel, delivery environment, and persuasive system design features will be extracted.

Findings: The review is in the screening process and results will be presented at the conference. They will contain an overview of eHealth and blended lifestyle interventions for children aged 0-5 in terms of design characteristics, delivery, and effectiveness. Interventions will be categorised according to effectiveness and the target groups will be compared to uncover differences, what worked, and possibly why.

Conclusion: Attention will be paid to whether there are any noticeable differences between design and content of lifestyle interventions for regular and low SES populations. We will discuss the most prominent differences and reflect on the implications for the design of interventions for preschool-aged children.

Why Aren't You Listenting To Me? Robot Autonomy And Compliance With Robot Advice

Jana Holthöwer (University of Groningen, Groningen - Netherlands), Jenny van Doorn (University of Groningen, Groningen - Netherlands), Stephanie Noble (Haslam College of Business, University of Tennessee, Knoxville, United States of America - United States of America)

Presenter: Jana Holthöwer

Abstract

Service robots on organizational frontlines, notably in health and elderly care settings, promise to tackle staff shortages. In such service contexts, compliance is crucial for consumer well-being, but compliance with robot advice remains problematically low, an issue that might be due to the effects of robot autonomy. Our research proposes that compliance might be increased effectively by robots with lower (rather than higher) autonomy, such that they act semi-autonomously (vs. autonomously) and share some control with a human or transmit advice generated by a human service worker.

In multiple studies, including two field studies with actual human–robot interactions, we establish how, when, and why robot autonomy affects the extent to which consumers comply with advice by a service robot. We propose that a message transmitted by a semi-autonomous robot on behalf of a human coworker appears more credible because the competent human coworker validates it.

In a field study in an elderly care setting, senior citizens were more likely to follow semi-autonomous robot advice validated by a nurse compared to autonomous, non-validated robot advice (Complysemi-autonomous = 68,4%, Complyautonomous = 31.6%, p = .035). In another field study conducted at a Dutch university, consumers complied more with the health-related advice of a semi-autonomous robot validated by a human coworker (vs. an autonomous robot) (Complysemi-autonomous = 80%, Complyautonomous = 66.3%, p = .030). In additional online studies, we established the underlying process of message credibility and find that within specific boundary conditions though, an autonomous robot can encourage human compliance to levels equivalent to those evoked by a semi-autonomous robot.

These findings hold enormous promise, especially for health care practitioners, institutions, and consumers for whom increased compliance can lead to better health outcomes, reduced hospital readmissions, improved patient recovery, and elevated well-being.

Exploring The Scope Of Personalization Of eHealth Through Design Lenses

Noa van den Brink (Technische Universiteit Delft - Netherlands), Timothy Houtman (Technische Universiteit Delft - Netherlands), Samantha Orozco (Technische Universiteit Delft - Netherlands)

Presenter: Timothy Houtman

Abstract

Background: Personalization is a promising strategy which is frequently used to enhance the relevance, usability, and efficacy of eHealth interventions. However, current personalization strategies often target only a limited aspect of an individual's health context and may not be suitable for diverse groups of people.

Typically, personalization involves tailoring interventions based on quantifiable health data like daily step counts, health literacy or willingness to change. However, this approach may overlook other latent needs related to healthy living of groups like those living in vulnerable neighbourhoods, patients, or youth. The personalization of digital technology can be approached on many different levels of interaction and focus on a wide variety of user characteristics. Health experiences are deeply personal and intertwined with daily life. Latent needs may only surface when investigating people's daily context and experiences and may lead to variables which are beyond the ones typically considered for personalization. Recognizing this limitation, the question arises: how might we expand the scope of personalization to also address the latent needs of more diverse groups of people?

In this workshop, we aim to compliment the conventional eHealth personalization, often based on explicit user characteristics, with the nuances of users' lived experiences from a human-centered design perspective. In this interactive workshop we will discuss how theory, methods and experiences from human-centered design can help facilitate a more holistic approach to personalization.

Methods: Participants will first map out their own perceptions of challenges and opportunities around personalization of eHealth. Then, the facilitators will present three lenses on how personalization could be approached from human-centred design: situatedness, value tensions, and ownership. Ultimately, participants will utilize the presented perspectives within a provided case, offering tangible insights into their real-world application.

Outcomes: Participants will gain a deeper understanding of three design lenses for approaching personalized eHealth development. By exploring these perspectives, we aim to introduce a complementary approach to conventional personalization methods. The workshop will highlight the added value of adopting human-centred design methods for personalizing eHealth technology. Through exercises and discussions, the participants will gain tools and methods to creatively and empathically navigate the evolving health technology landscape.

Caregiver's Evaluation Of Treatment Goals Generated By Large Language Models For Mental Health Patients

Lorenzo James (Eindhoven University of Technology, Eindhoven - Netherlands), Laura Genga (Eindhoven University of Technology, Eindhoven - Netherlands), Barbara Montagne (GGZ Centraal, Amersfoort - Netherlands), Muriel Hagenaars (Utrecht University, Utrecht - Netherlands), Pieter Van Gorp (Eindhoven University of Technology, Eindhoven - Netherlands)

Presenter: Lorenzo James

Abstract

Personalized goals as content for mHealth applications increase the engagement of patients with Severe Mental Illnesses (SMI), however, approximately only 25% of treatment plan goals for patients with SMI are measurable, posing a challenge for using them as personalized content in mHealth apps.

To address this, we developed a tool called the GOALS System, leveraging Large Language Models (LLMs) to facilitate the creation of measurable goals for both caregivers and patients.

We evaluated the quality of the goals generated by the tool with caregivers through an experimental study using a within-subject experimental design. The goals were evaluated using a combination of behavior change theories and then statistically analyzed using t-tests. The survey results and comments made by the caregivers were analyzed using thematic analysis.

During the intervention, caregivers initially evaluated a goal they created with a patient. Then, used this goal as input in the GOALS system to generate measurable goals, followed by rating the system-generated goal. Afterward, caregivers provided feedback through a survey on this goal-setting workflow. Caregivers (N=9) from various mental health teams of a Mental Healthcare Institute participated in the study in 2023.

Caregivers evaluated LLM-generated goals significantly higher than their own, with most evaluated elements showing statistically significant improvement ($p<0.05$). However, while the generated goals are more measurable, they may require caregivers to do additional research, and patients may be hesitant to share data with an AI system, concluded by the thematic analysis. Furthermore, the language of the generated goals may be too complex for some users, particularly older caregivers and patients lacking digital literacy.

The GOALS system has the potential to improve the goal-creation workflow, however, an intervention needs to be conducted with patients to gather feedback and evaluate the workflow.

Evaluation Of A Learning Community On Validating Serious Games For Health

Anouk Jansen (Windesheim - Netherlands), Fenne Verhoeven (Windesheim - Netherlands), Wouter Keuning (Windesheim - Netherlands), Gido Hakvoort (Windesheim - Netherlands), Boudewijn Dijkstra (NHL Stenden - Netherlands), Marike Hettinga (Windesheim - Netherlands)

Presenter: Anouk Jansen

Abstract

Background: Learning Communities (LCs) can be vital in addressing complex topics as they offer opportunities for collaborative learning, crossing socio-technical boundaries. Assessing and promoting the learning taking place in these LCs, can be conceptualized in different ways. In this project we evaluated structure, process and culture of a LC where collaborative learning takes place on how serious games for health can be validated in a practical manner by developers, leading to acceptable evidence for healthcare clients.

Methods: Our LC was launched in June 2023, with a physical kick-off meeting, followed by an online workshop including an interview assignment in September. The assignment was evaluated in a physical meeting in November. Semi-structured online interviews took place between November and December with representatives of each type of LC-participants. The interview guide was derived from three existing instruments for evaluation, including the value-creation framework by Wenger. Thematic analysis was done by three researchers, followed by an online validation group interview with all interview participants in January 2024.

Findings: Seven recurring themes emerged during evaluation interviews regarding the structure (LC-organization, LC-content), process (ideas for improvement, LCs in general) and culture (communication, role of participants, value for participants). In general, it showed that within the LC there should be a defined initiator who creates engagement and internal communication. Physical meetings were unanimously perceived as more positive and active than online meetings. In addition, the success of the LC appeared to depend on time and energy investments from both participants and facilitators.

Discussion: As far as we know, this is the first study evaluating a LC specifically focused on validating serious games for health. Our findings correspond with literature on LCs in general. We found challenges in operationalization of the evaluation of LCs. In future projects we will combine existing insights on LC-evaluation with more recent knowledge and our findings for this learning community.

Demonstration Social Robot Maatje: Increasing Self-Reliance In Clients With Autism

Ellen Janssen (Fontys, Eindhoven - Netherlands), Bas Kamer (Regional Autism Center, Helmond - Netherlands)

Presenter: Ellen Janssen

Abstract

Background: As known, the demand of healthcare in the Netherlands is rising and so is the shortage of healthcare personnel. In 2022, the Dutch government signed the IZA (i.e. Integrated Care Agreement). One of the main topics of the IZA is supporting the healthcare professionals and reducing their workload by implementing e-health solutions. Robot Maatje is a possible e-health solution.

The regional autism center (RAC) in Helmond provide care for clients with autism. These clients either live independently or within a group home. One of the main goals of the RAC is to enhance the self-reliance of clients, i.e. to help them achieve an acceptable level of functioning in the most important domains of daily life. Robot Maatje can support this process, by giving reminders and help clients structure their lives. Currently, approximately 50 clients of the RAC use robot maatje.

Description: Robot Maatje is a social robot that helps clients become more self-reliant. For example by giving reminders that it is time to do grocery shopping or to clean up the kitchen. It can also check the mood of the client and send a message to the formal or informal caretakers of the client if necessary. Therefore the robot can function as a first point of contact in case of need. There is an online platform to set up robot maatje for the client's specific needs.

Practical description of the demonstration: The study of research group People and Technology consists of a practical research to determine the effectiveness of robot maatje. The aim of the demonstration is to show the possibilities of robot maatje and to discuss case studies, experiences and lessons learned.

Simulation Based Medical Education: Qualitative Research Into The Needs And Values Of Stakeholders

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Presenter: Christina Jaschinski

Abstract

Background: Currently, the training of healthcare professionals relies mostly on learning in daily clinical practice. With the growing shortage of healthcare professionals and limited training capacity, DUTCH (Digital United Training Concepts for Healthcare) aims to transform the education of healthcare professionals by creating scalable digital resources and virtual simulation training (XR). DUTCH initially focuses on the training programs for operating room assistants, anesthesia nurses and radiology technicians. DUTCH consists of hospitals, knowledge institutions and medical- and technology companies. To optimally engage this diverse group of stakeholders in the transformation, this study aims to understand the needs and values of stakeholders with regards to simulation-based learning.

Methods: The research will be conducted by a team of researchers from Saxion and HAN between January – May 2024. To ensure a broad diversity in perspectives, participants will be purposefully sampled from all Dutch provinces, with a variety in role (student, professional, educator, technical developer), medical profession (operating room assistants, anesthesia nurses, radiology technicians), age and personal innovativeness. We aim to include a minimum of 125 participants. Semi-structured interviews (n=75) and future scenario sessions (n=50) will be used to explore the perspective of the different stakeholders. Topics include the needs and expectations with regards to simulation-based learning, potential barriers and facilitators of virtual training, and values such as autonomy, flexibility and social interaction. Interviews and scenario sessions will be recorded, transcribed and analyzed by multiple researchers using thematic analyses.

Findings: We will present the needs, values and preferences of diverse stakeholders with regards to simulation-based medical education. Our results will include a stakeholder map, several personas, user requirements and a preliminary business model canvas.

Conclusion: Our outcomes will be at the core of the design, development and implementation of the simulation-based learning modules and infrastructure for the future education of healthcare professionals.

Canal Skater: A Serious Game For Balance Training In Rehabilitation Care

C Jaschinski (Saxion University of Applied Sciences, Research Group Technology, Health & Care, Enschede - Netherlands), AM Moreno (Saxion University of Applied Sciences, Research Group Ambient Intelligence, Enschede - Netherlands), I Flierman (Roessingh Rehabilitation Center, Enschede - Netherlands), AIR Kottink (Roessingh Research and Development, Enschede - Netherlands), GB Prange-Lasonder (Roessingh Research and Development, Enschede - Netherlands), CTM Baten (Roessingh Research and Development, Enschede - Netherlands)

Presenter: Christina Jaschinski & Alejandro Moreno Celleri

Abstract

Background: In rehabilitation patients often struggle to adhere to their exercise regimen as it can be perceived as lengthy, monotonous and tiresome. This is reinforced by the fact that progress can be slow and sometimes stagnant. Serious games (SGs) can increase patient compliance by turning rehabilitation into a fun and interactive experience. Gaming elements such as competition and reward structures foster patient engagement and motivation. Visual and auditory feedback support the correct execution of exercises.

Development and Description: The serious game Canal-Skater was created during a 4-day game jam by a multidisciplinary team of students. The assignment was to create a rehabilitation game for dynamic balance. During the first briefing students received design guidelines, 4 personas and a set of example exercises. The guidelines and personas were based on focus groups and interviews with rehabilitation care professionals and game developers. Canal-Skater is an endless-runner-type game. Patients skate on the frozen canals of Amsterdam, change lanes, avoid obstacles and duck under narrow bridges. By leaning left and right rewards can be collected. Movements are based on dynamic balance exercises. The game includes a detailed dashboard where physiotherapists can control and customize various parameters including length, difficulty and movements. This is achieved through procedural generation, meaning that the game tracks are not created in advance, but they are (re)generated through an algorithm based on the selected parameters, allowing for in-depth personalization.

Practical Description of the Demonstration: In this demo visitors can experience the game and experiment with different set-ups, movements and levels. Canal-Skater uses a Microsoft Azure Kinect to track body movement. An area of around 3x4m with controlled light conditions is needed as a playing area. Our team will be present to help with the set-up and provide information on the research project.

Exploring The Potential Of Using Digital Phenotyping For Monitoring Late Effects After Breast Cancer

Arlene John (University of Twente - Netherlands), Julia Reus (University of Twente - Netherlands), Annemieke Witteveen (University of Twente - Netherlands)

Presenter: Arlene John

Abstract

Background: With an increasing number of cancer survivors requiring follow-up and the burdens of intensive face-to-face monitoring, finding alternative solutions is imperative. This study explores the potential of digital phenotyping, defined as ``moment-by-moment quantification of the individual-level human phenotype in situ using data from personal digital devices, in particular smartphones" (Torous et al., 2016) for unobtrusively unobtrusively monitoring late effects after breast cancer.

Methods: Following Mohr et al.'s (2017) hierarchical model, the study investigates smartphone sensors, low-level features, and high-level behavioral markers for passive monitoring of various late effects, including cardiotoxicity, neuropathy, lymphedema, fatigue, insomnia, anxiety, post-traumatic stress disorder, depression, and fear of recurrence. A literature search identified features and markers connecting sensor data with late effects. Additionally, three eHealth and monitoring experts were consulted. The number of features, markers and sensor systems identified per late effect was used to create a ranking.

Findings: The literature review uncovered diverse smartphone sensors and electronic activities generating passive data for monitoring late effects, like physical activity, location, and sleep rhythms. As an example, depression has several symptoms, including sleep disturbance, and fatigue. The associated markers include reduced participation in activities and difficulty falling asleep. Associated features include, less socializing that is tracked through GPS locations, irregular sleep cycles through screen-use times etc. Neuropathy, cardiotoxicity, and depression emerge as promising candidates based on the number of associated high-level markers, low-level features and sensors, highlighting the possibility of smartphone-based monitoring for late effects in cancer survivors.

Conclusions: This research explores the potential of digital phenotyping to track late effects after breast cancer and provides an overview of associated high-level behavioral markers, low-level features, and sensors. The ranking identifies neuropathy as most promising for monitoring through digital phenotyping. While offering a framework for subsequent studies, further data-driven validation for smartphone-based monitoring of late effects is crucial.

Digitization Of Cognitive Behavioral Therapy: From Treatment Room To Daily Life Through Co-Design

Fetsje de Jong (University of Groningen, University Medical Center Groningen, ICPE - Netherlands), Harriëtte Riese (University of Groningen, University Medical Center Groningen, ICPE - Netherlands), Nina Vollbehr (Lentis, Centrum Integrale Psychiatrie, Groningen - Netherlands), Annemiek Lely ((Not applicable) - Netherlands), Tom Verhage ((Not applicable) - Netherlands), Ando Emerencia (University of Groningen - Netherlands), Sander de Vos (GGZ Friesland, Leeuwarden - Netherlands), Sanne Booij (Lentis, Centrum Integrale Psychiatrie, Groningen - Netherlands), Michelle Servaas (University of Groningen, University Medical Center Groningen, ICPE - Netherlands)

Presenter: Fetsje de Jong

Abstract

Background: Cognitive Behavioral Therapy (CBT) is a widely used intervention for psychiatric disorders. A key component of CBT is the thought record, which involves examining negative thoughts and formulating helpful ones. However, the traditional paper-and-pencil method has limitations, such as retrospective bias and missing data. The Experience Sampling Method (ESM) minimizes these issues by having clients fill out a digital diary on their smart phone multiple times a day, providing insights into their mood and activities. ESM is already used in psychological treatment through Personalized Treatment by Real-time Assessment (PETRA), a scientifically based web application integrated into the electronic client record of eight major Dutch mental health institutions. However, there is currently no systematic method for collecting qualitative information such as in the thought record. In this study, we aim to integrate the thought record, and subsequent feedback (named DigiCGT1), into PETRA as a module using the ESM method.

Methods: The study initiates with focus groups involving clients, their significant others (n= 8), and clinicians (n= 8) to gather insights on the digital thought record and feedback module. Subsequently, prototypes are developed and assessed in subsequent focus groups. Finally, a pilot study is conducted within clinical practice with clients (n=45) diagnosed with psychiatric disorders undergoing CBT and their clinicians (n=45). In the pilot study, the digital thought record and feedback module is used for two weeks, followed by quantitative questionnaires and qualitative interviews to evaluate aspects such as content, feasibility, burden, utility, comprehensibility, and layout.

Findings/conclusion: While data collection has not yet commenced, we expect that enabling digital completion of the thought record and visualizing data in a feedback report will enhance the effectiveness of psychological treatment. The evaluation of the final product will inform future implementation of a digital thought record and feedback module in clinical practice.

Implementation Of Rehablines Databank To (Re)Use Routine Clinical Data For Scientific Research In Rehabilitation

Klaske van Kammen (University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, The Netherlands - Netherlands), Leonie Krops (University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, The Netherlands - Netherlands), André Bergsma (University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, The Netherlands - Netherlands), Jan Geertzen (University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, The Netherlands - Netherlands), Rienk Dekker (University of Groningen, University Medical Center Groningen, Department of Rehabilitation Medicine, The Netherlands - Netherlands)

Presenter: Klaske van Kammen & Leonie Krops

Abstract

Background A shift occurs from the use of existing research methods (e.g. trials) to the use of real-world data to generate evidence for clinical treatment, providing efficient generation of large, generalizable datasets. Within the Center for Rehabilitation of the University Medical Center Groningen (UMCG-CvR), multidisciplinary rehabilitation treatment is provided to people with various physical disabilities and/or chronic diseases. During this care, a vast and wide set of clinical data is collected. The Rehablines databank is initiated to re-use this clinical data for research. Rehablines aims to (1) Efficiently conduct high-quality research into patient characteristics and underlying disease processes, (2) Prove insight into treatment effects and efficiency, and (3) personalizing treatment with support of data from Rehablines.

Methods: Rehablines is a further-use databank, for which patients give their written informed consent. Ethical approval of the Central Ethical Committee of the UMCG was obtained for the set-up. In co-creation with the medical administrative team, an informed consent procedure was generated and implemented in phases. Data collection occurs during clinical care, no additional measurements are performed. Data extraction will be performed to generate pseudonymized datasets per scientific study.

Findings: A successful pilot was conducted with the pain rehabilitation team of UMCG-CvR (August-December 2023) and the procedure was subsequently implemented across the UMCG-CvR (January 2024). Currently, all patients (age >18 years) receiving rehabilitation care at the UMCG-CvR, are asked to participate. Current inclusion number is 203 patients.

Conclusion: Rehablines is a unique databank that purely focuses on the re-use of clinical data for research, being the first in its kind on rehabilitation in The Netherlands. The databank was successfully implemented at UMCG-CvR for all adult patients. Future steps are the inclusion of pediatric rehabilitation, and performing the first scientific studies using this promising research facility to further improve and personalize rehabilitation.

Randomized Controlled Trial: Continuous Monitoring Did Not Enhance Discharge Decision-Making In An Acute Admission Ward.

Niels Kant (Rijnstate Hospital, Arnhem - Netherlands), Sjoerd Garssen (Rijnstate Hospital, Arnhem - Netherlands), Carlijn Vernooij (Department of Patient Care and Monitoring, Philips Research, Eindhoven - Netherlands), Gert-Jan Mauritz (Rijnstate Hospital, Arnhem - Netherlands), Mark Koning (Rijnstate Hospital, Arnhem - Netherlands), Frank Bosch (Rijnstate Hospital, Arnhem - Netherlands), Carine Doggen (University of Twente, Enschede - Netherlands)

Presenter: Niels Kant

Abstract

Background: In acute admission wards, vital signs are commonly measured only intermittently. This may result in failure to detect early signs of patient deterioration and impede timely identification of patient stability, ultimately leading to prolonged stays. Therefore, continuous vital sign monitoring may improve hospital efficacy. The objective of this trial was to evaluate the effect of continuous monitoring on the proportion of patients safely discharged home from an acute admission ward.

Methods: In this randomized controlled trial, patients were randomized to either the control group, which received usual care, or the sensor group, which additionally received continuous monitoring using a wearable sensor called Healthdot (Philips Electronics, Eindhoven). The continuous measurements could be considered in discharge decision-making by physicians during the daily bedside rounds. Safe discharge was defined as no unplanned readmissions, emergency department revisits or deaths, within 30 days after discharge.

Findings: In total, 400 patients were randomized, of which 394 completed follow-up, with 196 in the sensor group and 198 in the control group. The proportion of patients safely discharged home was 33.2% in the sensor group and 30.8% in the control group ($p=0.62$). No significant differences were observed in length of stay, Intensive Care Unit admissions and Rapid Response Team calls. The trial was terminated prematurely due to futility.

Conclusion: Continuous monitoring did not affect the proportion of patients safely discharged from an acute admission ward. Implementation challenges of continuous monitoring may have contributed to the lack of effect observed. Our suggestion is to facilitate the seamless integration of continuous monitoring data into the Electronic Medical Record for enhanced accessibility. Additionally, we suggest the adoption of a standardized protocol for interpreting such data and propose the extension of continuous monitoring to all patients within a ward, as opposed to a subset, to enhance awareness and establish systematic routines.

Implementation Healthcare Technology In Connection With National Initiatives

Helma Kaptein (Hogeschool Rotterdam - Netherlands)

Presenter: Helma Kaptein

Abstract

Background: Last year, the shortage among healthcare personnel was around 49,000 people. This will rise to 135,000 in the coming years. To continue providing good care, healthcare organizations see healthcare technology as one of the ways to support healthcare professionals. However, scaling up of the use of healthcare technology in the workplace of healthcare organizations is challenging. To achieve this, the IZA agreement, among other things, has been signed by parties active in health and welfare in which goals have been set. Higher education institutions can provide a significant contribution to achieving its goals.

Methods: To create more uniformity in value determination and scaling up, several initiatives have been launched aiming for a researcher-independent approach. For example, Vilans has instigated the consortium value determination. Additionally, initiatives such as, 'Digizo.nu', 'de vliegwiel coalitie' and 'passende zorg' help bringing (higher) research and education together to help the health care institutes more effective.

Findings: Shaping the role of the universities of applied science, with a clear regional footprint, within the national ecosystem is a challenging puzzle. The interests of individual researchers, universities, and the general interest sometimes appear contradictory. PIT, the Platform for the Deployment of Technology for Health and Welfare, plays an important role in bringing together different professorships to collectively generate more impact in the region.

Conclusion: To participate in the national network, it is essential for the universities of applied science to collaborate. Only in this way the added value of the institutions will be recognized and optimally utilized. The breadth of new national initiatives makes it possible to give our practice partners more and more opportunities to actually use technology in a good way, bringing the IZA goals closer and helping the patient/citizen better while ensuring the sustainability of the deployment of (healthcare) personnel.

Validity Challenges In Serious Games For Health: A Collective Case Study

Wouter Keuning (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Hilco Prins (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Fenne Verhoeven (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Anouk Jansen (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Gido Hakvoort (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Boudewijn Dijkstra (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences - Netherlands), Jetse Goris (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences - Netherlands), Sybrith Tiekstra (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences - Netherlands), Marike Hettinga (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Derek Kuipers (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences - Netherlands)

Presenter: Wouter Keuning

Abstract

Background: The use of serious games as educational tools for healthcare professionals and patient interventions is rising, offering potential cost savings and quality improvements in healthcare. Customers from healthcare/educational organizations often ask about clinical effectiveness of these games. However, Dutch developers of games for health, mostly small/medium-sized enterprises (SMEs), lack the resources/expertise for longitudinal research. Simultaneously, SMEs unknowingly demonstrate various validity types during game development. The lack of language to articulate one's own expertise in a way that is understandable for healthcare customers, causes SMEs to miss assignments and fewer promising games reaching healthcare. Our goal is to help developers effectively integrate validity into their processes to deliver credible evidence to customers. This abstract outlines our initial project phase, focusing on (game)development processes, validation, and customer collaboration and communication.

Methods: Interviews with nine SMEs were conducted to identify compelling case studies. Three cases were selected to encompass the diverse range of scenarios found: two customer-oriented cases aimed at professionals and one internally initiated case aimed at patients. In September 2023 four semi-structured interviews were conducted with project leaders, developers and customers. Four researchers conducted thematic analysis.

Findings: Case studies revealed active involvement of customers in the, mostly iterative, development process including involvement of domain experts and extensive testing with the target audience. Additionally, it showed that SMEs engage in validation to varying extents throughout this process, as well as they are aware/have become aware over time, that semantics play an important role in communication with (potential) customers.

Discussion: The SMEs demonstrate a thorough process; however, the aspect of validity of the design process does not seem to be adequately highlighted. Our future research will focus on developing boundary objects to assist SMEs in making validity more explicit and help them achieve a shared understanding with their customers about validity.

State Of Digital Care In The Netherlands In 2023

Jelle Keuper (Nivel - Netherlands), Anke Versluis (NeLL - Netherlands), Eva Alblas (RIVM - Netherlands), Jiska Aardoom (NeLL - Netherlands), Lilian van Tuyl (Nivel - Netherlands), Liza van Deursen (RIVM, NeLL - Netherlands), Roos van der Vaart (RIVM - Netherlands), Lucille Standaar (Nivel, RIVM - Netherlands), Brigitta Keij (RIVM - Netherlands)

Presenter: Jelle Keuper

Abstract

Background: The healthcare sector is under pressure due to aging populations, staff shortages and rising costs. Digital care could help to keep healthcare accessible while maintaining its quality. However, what is the current state of digital care in the Netherlands, and what developments are visible over time? What is the role of digital care regarding several social challenges (e.g., healthcare provider workload and job satisfaction) in Dutch healthcare? In this study, we aimed to answer these questions.

Methods: In April-June 2023, doctors and nurses from various healthcare sectors, healthcare users and people with chronic diseases were surveyed about their use of, and experiences with, several digital care services (e.g., digital self-care and communication services) in the past 12 months. In addition, in-depth research was performed regarding the impact of digital care use on healthcare provider workload and job satisfaction, using focus group discussions. Survey data from 2023 was analysed using descriptive statistics and compared with 2021 and 2022 survey data. Focus group discussions were analysed through a brief thematic analysis.

Findings: The use of most digital care services by healthcare providers stabilized in 2023, while the use of some other services (e.g., medication dispensers) further increased. In general, most healthcare providers are positive about digital care. The focus group discussions showed that digital care services which lower workload, generally increase job satisfaction. However, further improvements are needed for digital care to efficiently support healthcare. Compared to 2021, slightly more patients used digital care. Similar to previous years, it was found that patients with lower education and the elderly make the least use of digital services.

Conclusion: To successfully support healthcare, further improvements to digital care are needed to better integrate them into routine healthcare processes and to better fit users' needs.

General Practices' Experiences With Patients' Web-Based Access To Medical Records

Jelle Keuper (Nivel, Tilburg University - Netherlands), Ronald Batenburg (Nivel, Radboud University Nijmegen - Netherlands), Lilian van Tuyl (Nivel - Netherlands), Robert Verheij (Nivel, Tilburg University - Netherlands)

Presenter: Jelle Keuper

Abstract

Background: Patients' web-based access to their medical records is expected to increase their role and responsibility in managing their health and supporting shared decision-making. As of July 2020, general practices in the Netherlands are legally obliged to provide their patients access to their electronic medical records. To facilitate general practices, a national support program ("OPEN") was started, which included scientific research activities and was funded by the Ministry of Health, Welfare and Sport. This research focused on (1) how general practice staff experienced providing their patients web-based access, (2) how general practices perceived its impact on patient consultations, administrative actions, and patient inquiries, and (3) how they perceived its effect on workflow.

Methods: In October 2021, Dutch general practices were surveyed about their experiences with the provision of patients' web-based access, and how they perceived its effect on routine general practice workflow. Results were analysed from a diffusion-of-innovation perspective, exploring differences between practices that started relatively early, and later with providing web-based access (i.e., before 2020, in 2020, or in 2021).

Findings: Experiences of general practices with patients' web-based access were diverse. Two-thirds of the practices reported an increase in e-consultations and administrative tasks associated with web-based access provision. Only a small proportion of the practices experienced a decrease in patient contacts. Earlier adoption of web-based access was associated with a more positive attitude toward web-based access and more positive effects on patient contacts and workflow.

Conclusion: The general practices surveyed were mainly positive or neutral about providing web-based access but also experienced an increased number of patient contacts and administrative tasks. Further monitoring of general practice experiences is needed to understand the temporal, structural, intended and unintended effects of patients' web-based access for general practices and their staff.

The CeHRes Roadmap 2.0

Hanneke Kip (University of Twente - Netherlands), Nienke Beerlage-de Jong (University of Twente - Netherlands), Lisette van Gemert-Pijnen (University of Twente - Netherlands), Saskia Kelders (University of Twente - Netherlands)

Presenter: Hanneke Kip

Abstract

Background: Despite its potential, eHealth technologies often do not have the desired impact on practice. A reason for this is a suboptimal fit between technology, people, and context. The original CeHRes Roadmap aims to improve this fit by providing an interdisciplinary, holistic framework to shape development, implementation, and evaluation processes of eHealth. While it has been successfully used in research and practice, new developments and insights have arisen since its publication, highlighting the need for its revision. In this poster, we will present the updated version of the CeHRes Roadmap.

Methods: The Roadmap was updated using four types of sources: (1) experiences with its application in research, (2) literature reviews on eHealth development, implementation and evaluation, (3) discussions with eHealth researchers, and (4) new insights and updates from relevant frameworks and theories.

Findings: The five principles for eHealth development, implementation and evaluation are updated. These are related to (1) ongoing and intertwined processes, (2) a holistic approach, (3) continuous evaluation, (4) stakeholder involvement, and (5) interdisciplinary collaboration. Moreover, the objectives and examples of methods and frameworks are updated for all phases of the Roadmap: contextual inquiry, value specification, design, operationalization, summative evaluation, and formative evaluation. Last, the visualization of the CeHRes Roadmap is updated, emphasizing the interrelationship between all phases.

Conclusion: Several changes were made to the Roadmap, while still retaining the main essence of the first version. The updates emphasize the importance of interrelated processes, the iterative nature of the Roadmap, interdisciplinary collaboration, designing for behaviour change, implementation of eHealth in practice, and multi-method, iterative evaluation. Just as eHealth development, the Roadmap is also never really finished, which highlights the need for sharing experiences with application of eHealth-frameworks in research and practice to allow for their continuous improvement.

The CeHRes Roadmap 2.0

Hanneke Kip (University of Twente - Netherlands), Nienke Beerlage-de Jong (University of Twente - Netherlands), Saskia Kelders (University of Twente - Netherlands)

Presenter: Hanneke Kip

Abstract

Background: In this first presentation, the symposium will be introduced and the recently updated CeHRes Roadmap 2.0 is presented. While it has been successfully used in research and practice, new developments and insights have arisen since the first publication of the original Roadmap in 2011 – not just within the domain of eHealth, but also within the different disciplines in which the Roadmap is grounded. Because of these new developments and insights it was imperative to revise the Roadmap

Methods: The Roadmap was updated based on four types of sources: (1) experiences with its application in research, (2) literature reviews on eHealth development, implementation and evaluation, (3) discussions with eHealth researchers, and (4) new insights and updates from relevant frameworks and theories.

Findings: In this presentation, the pillars and phases of the CeHRes Roadmap 2.0 will be presented, emphasizing the most important updates. The pillars are related to eHealth development, implementation and evaluation require (1) ongoing and intertwined processes, (2) a holistic approach, (3) continuous evaluation, (4) stakeholder involvement, and (5) interdisciplinary collaboration. The phases of the Roadmap that will be described are contextual inquiry, value specification, design, operationalization, summative evaluation, and formative evaluation.

Conclusion: While the Roadmap does provide a framework for eHealth development, implementation, and evaluation, it should not be viewed as a step-by-step approach. Because of the complexity of eHealth development in practice, its application can be challenging. In order to learn from each other, researchers have to share their experiences with using (parts of) the CeHRes Roadmap.

Optimizing An Online Intervention For The Prevention Of Depression (SPRINT): A Full-Factorial Trial

Annet Kleiboer (Vrije Universiteit Amsterdam - Netherlands), Claire van Genugten (Vrije Universiteit Amsterdam - Netherlands), Leah Buhrmann (Northumbria University - United Kingdom), Heleen Riper (Vrije Universiteit Amsterdam - Netherlands)

Presenter: Annet Kleiboer

Abstract

Background: Online interventions can be effective for the prevention of depression, but engagement in these programs can be improved. Options to optimize online interventions have been identified. In this study, we examined whether the effectiveness of an online intervention for depressive symptoms can be improved by: (1) human guidance, (2) online motivational interviewing, and (3) mobile-based personalized feedback messages.

Methods: The study used a full-factorial (2X2X2) trial design to examine the additional effects, either alone or in interaction, of the three components. 307 adults aged 18 or older with mild to moderate depression were recruited via an open recruitment strategy. The online intervention (Moodbuster-Life) was a 6-week intervention based on cognitive behavioural therapy. All participants received the online intervention together with no or a maximum of 3 additional components. The primary outcome was symptoms of depression measured 6 weeks after baseline. Secondary outcomes were the number of modules completed and engagement in the program.

Findings: The results showed a significant decrease in symptoms of depression between baseline and follow-up (d=0.76). Use of additional components did not contribute to the outcome. Participants completed 2.2 modules on average. Participants that received human guidance showed higher completion rates, which increased further if they also received motivational interviewing. The use of additional components was not related to differences in engagement in the program.

Conclusion: In line with previous studies, human guidance was related to higher adherence rates, but we could not replicate previous findings that showed better outcomes.

The In-Depth Evaluation Process Of DEEP, A Virtual Reality Biofeedback Game, In Forensic Psychiatric Inpatient Care

Lisa Klein Haneveld (Transfore - Netherlands), Tessa Dekkers (University of Twente - Netherlands), Yvonne Bouman (Transfore - Netherlands), Saskia Kelders (University of Twente - Netherlands), Hanneke Kip (University of Twente / Transfore - Netherlands)

Presenter: Lisa Klein Haneveld

Abstract

Background: The challenge of preventing aggression in forensic psychiatric patients is complex, due to often low treatment motivation and suboptimal cognitive skills. A potentially suitable intervention is DEEP, a VR-biofeedback game designed to teach diaphragmatic breathing. However, little is known about if, when and for whom DEEP can be most effective. To address these questions multiple evaluation studies were and will be conducted.

Methods: We will present three studies. The first involved focus groups and interviews on expectations regarding DEEP with 24 healthcare professionals and 13 forensic inpatients. The second study employed a single-case experimental design (SCED) with six inpatients to assess the short- and long-term effects of DEEP on physiological arousal, stress, and anger. The third study, an upcoming mixed-method pilot-RCT within the realist evaluation framework, aims to further evaluate DEEP across four Dutch forensic psychiatric organizations.

Findings: The qualitative findings of the focus group suggested that DEEP holds promise in aiding patients with relaxation and emotion regulation, presenting itself as a transdiagnostic intervention applicable in structured treatment settings or on an ad hoc basis. Moreover, in the SCED, significant reductions in arousal, stress, and anger were observed in three patients, with a clear causal link to DEEP established in one case. Finally, in the mixed-method pilot-RCT, 30 inpatients will be assigned to three groups: DEEP, a comparable VR-intervention without biofeedback, and a treatment-as-usual (TAU) control group. The hypothesis is that DEEP will outperform TAU and the other intervention because of the important role of biofeedback.

Conclusion: These studies emphasize the value of small-sample, in-depth evaluation methods, such as SCEDs and pilot-RCTs, particularly in challenging populations that are often hard-to-involve. They also underscore the iterative process of evaluating innovative technologies, emphasizing stakeholder involvement in every stage.

Implementation Of Virtual Reality Technology In Mental Healthcare – A Longitudinal Qualitative Evaluation

Marileen Kouijzer (University of Twente - Netherlands), Hanneke Kip (University of Twente - Netherlands), Yvonne Bouman (Transfore - Netherlands), Saskia Kelders (University of Twente - Netherlands)

Presenter: Marileen Kouijzer

Abstract

Background: Implementation of innovative technologies like virtual reality (VR) into mental healthcare requires a careful iterative approach to ensure successful use in clinical practice. In this presentation, we focus on the development and operationalization of a VR training program designed for healthcare providers working in mental healthcare settings. This study aims to explore the process of implementing VR technology.

Methods: The VR training program was developed based on identified implementation factors in previous research. Implementation is an iterative process and should be studied accordingly. A longitudinal qualitative evaluation was conducted consisting of three interviews with 11 healthcare providers: one before, one directly after, and one three months after the training. The first round involved exploring participants' expectations regarding the VR training. In the second round, participants' experiences with the training were identified, including key areas for improvement. Finally, the third round examined the long-term experienced impact of the training on VR usage.

Findings: Preliminary findings indicated diverse expectations among healthcare providers regarding the potential benefits and challenges of VR training. Early experiences with the program revealed nuanced insights into its effectiveness and perceived value in enhancing the implementation of VR technology in practice. Furthermore, the ongoing evaluation of the training highlighted both successes and lessons learned to improve the integration of VR in practice.

Conclusion: The integration of VR in mental healthcare requires an iterative implementation approach. Our study underscores the importance of ongoing assessment and adaptation throughout the implementation process to foster successful integration for both healthcare providers and patients. The description of a systematic implementation of eHealth technology is often lacking in theoretical frameworks. By engaging in a longitudinal qualitative evaluation, we aim to contribute valuable insights into this systematic approach and offer guidance for future initiatives seeking to integrate innovative technologies in clinical practice.

Caring For Caregivers: Using Radar For Privacy Preserving And Non-Intrusive Health Monitoring Enabling Peace Of Mind In Informal Care

Rik Kraan (Valtes - Netherlands), Erjen Derks (Valtes - Netherlands), John Beuving (Valtes - Netherlands)

Presenter: Rik Kraan

Abstract

Background: The Netherlands currently has more than 5 million informal caregivers. By 2040, it is anticipated that every adult will be involved to some extent in caregiving responsibilities for people in their surroundings. Notably, 9% of informal caregivers express a sense of overload due to their caregiving duties in combination with their regular commitments such as work and school. A significant contributing factor is a lack of peace of mind when informal caregivers are not physically present with their care recipients.

Aiming at providing this peace of mind for informal caregivers, Valtes is building a platform for non-intrusive in-house health monitoring using radar technology. The primary objective is to assist informal caregivers in their caregiving tasks and enable them to check the health of their loved ones remotely.

Description: Valtes uses a radar system that enables precise detection of objects (persons) in the room in a non-intrusive way. Through several artificial intelligence models, the radar observations are interpreted to facilitate detection such as people tracking, fall detection, heart and breath rate monitoring and sleep pose identification. The comprehensive monitoring enables a smart alarming system that notifies informal caregivers of events such as detected falls, contributing to an enhanced sense of peace of mind through the continuous presence of the system.

Practical description of the demonstration: The demonstration will show the capabilities of the radar in combination with our AI algorithms in human activity recognition. We will show a pre-recorded experiment in which a person walks through the room and performs activities such as sitting, lying down and falling down. Radar data will be shown side-to-side with camera footage displaying the accuracy of several detection such as people tracking, fall detection, breath and heart rate monitoring and sit/sleep detection.

Predicting Weekly Variability In Depressive Symptoms Using Deep Learning And Passively-Collected Movement Data

George D. Price (Dartmouth College - United States of America), Anna M. Langener (University of Groningen - Netherlands), Dawson Haddox (Dartmouth College - United States of America), Michael V. Heinz (Dartmouth College - United States of America), Daniel M. Mackin (Dartmouth College - United States of America), Matthew D. Nemesure (Harvard University - United States of America), Amanda C. Collins (Dartmouth College - United States of America), Damien Lekkas (Dartmouth College - United States of America), Tess Z. Griffin (Dartmouth College - United States of America), Arvind Pillai (Dartmouth College - United States of America), Subigya Nepal (Dartmouth College - United States of America), Andrew T. Campbell (Dartmouth College - United States of America), Nicholas C. Jacobson (Dartmouth College - United States of America)

Presenter: Anna Langener

Abstract

Background: Major Depressive Disorder (MDD) is a prevalent mental health disorder often identified by persistent low mood, and a lack of motivation and energy. Persons with MDD often experience fluctuations in their symptoms over hours and days, which is associated with reduced quality of life. Consequently, researchers have argued that stabilizing depressive symptoms should be a primary treatment goal. However, there remains a gap in our understanding of how feasible it is to accurately predict fluctuations in depressive symptoms. In this preregistered study, we aim to explore the ability to predict weekly fluctuations in depressive symptoms using deep learning models among individuals diagnosed with MDD.

Methods: To minimize participant burden and enhance the practicality of our approach, we exclusively utilized passively-collected movement data to predict variability in depressive symptoms. Our sample contains clinically-depressed individuals per a structured clinical interview (N = 179, Mean Age = 38.2 ± 10.0, Women = 81.6%). Participants filled out their depressive symptom assessments three times a day over the course of 90 days. We used an ensemble 2D convolutional neural network deep-learning model to predict weekly fluctuations in depressive symptoms.

Findings: Our results suggest a small-moderate correspondence between the predictions and observed outcomes of passively-collected movement alone in predicting future high/low depression variability (AUCTest = 0.59 ± 0.06, SensitivityTest = 0.30 ± 0.13, SpecificityTest = 0.81 ± 0.10).

Conclusion: While our results provide valuable insight into the capacity for solely passively-collected movement information to independently predict variability in depressive symptoms, there is a need to improve predictive performance to enhance clinical utility. This may require the inclusion of additional passive sensing modalities in future research.

Wearable, Wireless Continuous Vital Signs Monitoring In The General Ward: A Hybrid Implementation-Effectiveness Study

Job Leenen (Lectorate IT innovations in Healthcare, Windesheim University of Applied Sciences, Isala Hospital - Netherlands), Gijs Patijn (Isala hospital - Netherlands)

Presenter: Job Leenen

Abstract

Background: Wearable, wireless continuous vital signs monitoring (CMVS) with wearable sensors can contribute to earlier detection of clinically deteriorating patients in general wards in the hospital. However, clinical implementation remains challenging. In recent years, two feasibility studies were conducted at Isala Hospital, leading to an implementation-effectiveness study in two general wards. The aim of this study was to determine 1) the success of implementation and 2) explore effects of the CMVS-intervention on patient outcomes.

Methods:
Design: A type-2 implementation-effectiveness hybrid design study for parallel evaluation of implementation (6-month prospective mixed-methods process evaluation) and patient outcomes (before-after) was perfomed. A historical cohort from 2019-2021 served as the control group.
Intervention: The CMVS-system consisted of monitoring with Philips Healthdot sensor and 6 times daily trend assessments. Standard care was manual vital signs measurements (1x daily).
Data collection and analysis: Primary endpoint: compliance to trendmonitoring per shift (process evaluation) and length of stay (effect evaluation). Secondary outcomes were: nurses' acceptability with surveys and interviews (process evaluation) and 12 patient outcomes (effect evauation).

Findings: Mean intervention compliance was 71% (n=6200 nursing shifts in 384 patients). Compliance decreased significantly over 6 months. This decrease appeared to be dependent on the importance of bedside nursing assessment and moderate usability of the technology. Length of stay was significantly shorter in the intervention group (n=908; 5.0 vs. 5.5 days) but all other secondary outcomes were similar. In 35% of patients based on trend assessments 109 additional nursing actions were performed.

Conclusion: The CMVS-intervention was successfully implemented, but compliance to the intervention decreased over time. This was possibly related to the limited impact on patient outcomes and moderate usability of the technology.

Challenges Experienced By Healthcare Professionals, Researchers And Policymakers In Artificial Intelligence Implementation: An Interview Study

Job Leenen (1.Research group IT Innovations in Healthcare Windesheim University of Applied Sciences. 2: Connected Care Center, Isala - Netherlands), Martine ten Hoeve (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands), Paul Hiemstra (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands), Gido Hakvoort (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands), Marike Hettinga (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands)

Presenter: Job Leenen

Abstract

Background: As healthcare is facing major challenges around the world, the application of artificial intelligence (AI) is gaining momentum. However, the transition of viable AI solutions to clinical implementation is minimal. To gain insights into underlying challenges when bringing AI solutions to clinical practice, this study aims to explore the experiences of healthcare professionals, researchers and policymakers on AI implementation in healthcare.

Methods: Semi-structured interviews were performed. Three groups were purposively selected for their experience and diverse perspectives on AI development in hospitals: healthcare professionals, researchers, and policymakers. The interview guide was based on the domains of value, application, technology, governance and ethics as described in the 'Hulpmiddel Handelingsruimte Waardevolle AI'. Thematic analysis was performed with Atlas.ti.

Findings: In total, thirteen interviews were conducted (average duration 52.1±5.4 minutes). From the thematic analysis the 4 following themes emerged. First, the theme 'technology-push versus demand-pull' highlights the challenge of starting from clinically relevant problems versus the availability of commercial AI-models. Second, the 'goal of development' covers the differences between primary goal of 'research use only' and implementation, and uncertainty about direction after the initial research phase. In relation to this, the theme 'multidisciplinary collaboration' emerged which highlights the challenges of a multidisciplinary approach, especially in relation to nurses and staff departments on legal and IT. For the last theme, 'role of the hospital', participants mentioned the need for a clear vision and strategy of the hospital to determine the focus of AI development, particularly in terms of whether one is a manufacturer.

Conclusion: This study highlights the complexity and variety of challenges of AI implementation in clinical practice and identified four themes on which healthcare organisations should focus to bring AI to clinical practice. For future work we aim to develop and study tools that support on these topics.

Experimenting With Alarm Strategies To Prevent Alarm Fatigue In A Neonatal Intensive Care Unit Using A Digital Twin

Job Leenen (1.Research group IT Innovations in Healthcare Windesheim University of Applied Sciences. 2: Connected Care Center, Isala - Netherlands), Wim Rill (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands), Gido Hakvoort (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands), Marike Hettinga (Research group IT Innovations in Healthcare Windesheim University of Applied Sciences - Netherlands)

Presenter: Job Leenen

Abstract

Background: With the continuous monitoring of vital physiological parameters of newborn babies, the number of alarms in neonatal intensive care units (NICUs) is high. As each alarm requires a response, this leads to alarm pressure on NICU nurses, inefficient workflows, increased alarm fatigue and, in turn, patient safety. Although studies show that only 20% of alarms are clinically relevant, experimenting with changes to medical device settings to improve alarm quality is not practical in a clinical setting. This is where digital twins (DTs) could offer a solution. By using a digital replica of the physical, dynamic and complex NICU environment in which data from patients, medical devices and their interactions can be simulated, artificial intelligence can make predictions about the impact of changing these medical device settings. The aim of this project is to develop a proof-of-concept for a DT to optimise alarm frequency in a NICU.

Methods: The project is divided into the following steps: a rapid literature review on DTs in healthcare and alarm optimisation strategies. Subsequently, an observational study of alarm frequency and follow-up. Followed by a survey to measure NICU nurses' experienced alarm fatigue using the Charité Alarm Fatigue-Questionnaire and finally, development of a proof-of-concept of a DT of a NICU.

Findings: The rapid review identified 504 potentially relevant studies, with 16 on DTs and 11 on alarm frequency and fatigue. None of these studies focused on DTs for the NICUs. Several strategies for optimising alarm frequency and fatigue were identified, but mainly focused on adult high care units.

Conclusion: DTs seem to be an unexplored area for optimising alarm frequency in NICUs but could have great potential. Currently, the observational study, survey, and proof-of-concept of a DT are in development. Preliminary findings will be expected in the next few months.

Nurses' Experiences Of Employment In Novel Hospital-Based Virtual Care Centres In The Netherlands: A Qualitative Study

Job Leenen (1.Connected Care Center, Isala, Zwolle, The Netherlands 2.Research Group IT Innovations in Healthcare, Windesheim Univ - Netherlands), Yvonne Jordens (Isala, Zwolle, The Netherlands - Netherlands), Alyssa Wegman (Health Technology and Services Research, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Lieke Heesink (Health Technology and Services Research, Faculty of Behavioral, Management and Social Sciences, University of Twente - Netherlands), Anke Lenferink (University of Twente, Rijnstate, Medisch Spectrum Twente - Netherlands)

Presenter: Job Leenen

Abstract

Background: Hospital-based virtual care centres (VCCs) facilitate the provision of remote monitoring and home-based patient care. Although since the COVID-19 pandemic, VCCs have rapidly emerged, there is no standardized framework for the development and implementation of VCCs. In order to develop such a framework, insight in current experiences of employment in VCCs is needed. Therefore, the aim of this study was to explore nurses' perceptions and experiences of working in VCCs.

Methods: Semi-structured interviews were conducted with nurses from four VCCs in the Netherlands and a six-stage thematic analysis was performed. Subsequently, themes of nurses' perceptions and experiences of VCC employment were mapped into the Capability, Opportunity and Motivation of Behaviour (COM-B)-model. This behavioural change model includes important aspects for successful and sustainable implementation of VCCs.

Findings: Thirteen nurses (age 45±8 years;100% female) were interviewed, yielding six themes: 1)' Changing role of nurses', especially in the patient-professional relationship, communication and in transforming care; 2)'Data to support clinical judgement' included data availability, integration of nurses' clinical perspective and the nurses' need for general medical knowledge, 3)'Education and training', consisted of the need to keep nurses' knowledge up-to-date and to create time for education; 4)'Organisation of care', consisted of nurses' involvement in the development of protocols and technological perquisites ; 5)'Collaboration with colleagues' consisted of the support by healthcare professionals and lack of recognizing benefits; 6)'Experienced effects of VCCs' included advantages and disadvantages for the VCC nurses, patients and the hospital. All themes included components of capability, opportunity and motivation.

Conclusion: Our findings highlight the importance of considering COM-B components of nurses' work in VCCs. Due to the changing roles of nurses in VCCs, there are evolving educational needs in the communication with patients and colleagues, and data use, as well as providing technical optimisations to further develop (the implementation of) VCCs.

The Added Value Of VR In Health Care Education

Astrid Timman (HAN University of Applied Sciences - Netherlands), Yrsa Niels (HAN University of Applied Sciences - Netherlands), Rinske de Groot (HAN University of Applied Sciences - Netherlands), Maurice Magnee (HAN University of Applied Sciences - Netherlands)

Presenter: Maurice Magnee

Abstract

Session theme: Simulation learning and serious gaming in health care education

Background: Virtual Reality (VR) can enhance traditional teaching methods by offering more practice moments and by offering personalized tools for monitoring learning. In a previous study, we developed a VR simulation, in which students of various health education programs can practice their communication skills by conversating in real-time with a virtual client (Magnée et al., 2023). In the present study, we investigated the added value of this VR simulation in health care education.

Methods: A total of 445 first-year nursing students at HAN University of Applied Sciences participated in a cluster randomized trial. Groups were randomized as classes (each class containing 24-27 students) into intervention and control groups. Students in the intervention group were given the opportunity to practice conversation skills in a virtual intake interview for 10 days outside regular classes. The VR simulation contained structured real-time conversations with a virtual client and were digitally coached through the conversation. They received personalized feedback in a virtual dashboard which provided them with the opportunity to monitor their own learning progress. Students in the control group received education as usual. We measured learning motivation pre and post study by means of a self-assessment (ARCS model; Smal, 1997) and exam grades were obtained at the end of the semester. Log information from the VR software provided us with detailed play behavior, times and duration of play and scores within the VR simulation.

Findings: We will present the results of the trial during our presentation. Primary outcome measures include grade results, clustering the timing of the VR training in three separate cohorts (Beginning, middle and end of semester). Secondary measures include learning motivation before and after VR training, in relation to the actual use of the simulation as measured by log-data.

A Contextual Inquiry And Value Specification In Chronic Obstructive Pulmonary Disease Exacerbation Management

Atena Mahboubian (Leiden University Medical center and National eHealth Living Lab, Leiden - Netherlands), Marise Kasteleyn (Leiden University Medical center and National eHealth Living Lab, Leiden - Netherlands), Jiska Aardoom (Leiden University Medical center and National eHealth Living Lab, Leiden - Netherlands), Niels Chavannes (Leiden University Medical center and National eHealth Living Lab, Leiden - Netherlands)

Presenter: Atena Mahboubian

Abstract

Background: Chronic Obstructive Pulmonary Disease (COPD) exacerbations negatively impact patient's physical and psychological health, requiring early prevention and treatment. Yet, efficient and easy accessible tests for exacerbation management are lacking.

eHealth innovations seek to transition to Remote Patient Monitoring (RPM) but face challenges in obtaining unbiased data in a non-invasive manner. A non-invasive handheld breathalyzer is under development for RPM to predict lung exacerbations by measuring breath biomarkers. Seamless integration into patient's care ,focusing on exacerbation prevention, and daily lives necessitates a thorough understanding of user needs throughout product and process development.

This study aims to identify and understand the breathalyzer's prospective users, other relevant stakeholders involved, and the RPM processes within COPD exacerbation prevention care and identify effective ways to generate most value for end-users in RPM care processes using the breathalyzer.

Methods: This study is constituted to a broader research project seeking to co-create a RPM handheld breathalyzer, and corresponding care process, tailored to the lives and healthcare needs of patients with COPD and HPCs in COPD care.

Firstly, the contextual inquiry primarily aims to understand the context of COPD care with a main focus on exacerbation prevention, through approximately twenty in-depth interviews. Consequently, the different end-users' (i.e., personas) needs, requirements, and values will be determined for both product and care process in the value specification phase through three focus groups. This process will involve techniques like customer journey mapping (CJM) and process mapping (PM).

Study participants will be end-users (i.e., patients, health care professionals) and other stakeholders involved in COPD care or eHealth development and implementation.

Findings: Data collection is planned, the findings will be presented during the conference.

Conclusion: This study aims to identify core end-users needs, requirements and values related to product and care process facilitating the development and successful adoption of eHealth in COPD exacerbation prevention care.

An How To: Developing Digital Mental Health Interventions

Esther Mertens (Leiden University, Leiden - Netherlands), Jean-Louis van Gelder (Max Planck Institute for the Study of Crime, Security and Law, Freiburg im Breisgau; Leiden University, Leiden - Germany)

Presenter: Esther Mertens

Abstract

Technology offers many opportunities for innovative approaches to improve mental health. As a result, the development of digital mental health interventions has increased rapidly in the last years. While there are multiple frameworks for the development of mental health interventions, steps guiding development from theoretical intervention techniques into specific technological features are commonly lacking. Therefore, we present the Digital Intervention Development Guide. This guide extends the Behavioral Intervention Technology framework with additions in 1) theoretical mechanisms, 2) intervention conceptualization, and 3) choice of delivery technology.

During the presentation, I will zoom in on the steps that explicitly address the theory translation process with a focus on intervention development for smartphone applications and virtual reality. I will address development aspects that are specific to digital mental health interventions, such as conceptualization of the intervention to facilitate storytelling, the choice of delivery technology and its usage aims, and the development of individual technological features. I will illustrate these steps using case examples from the development process of a mental health intervention that can be delivered through both a smartphone application and virtual reality.

Cultural Differences In Technology Acceptance Of COPD Patients: A Crosscountry Focusgroup Study

Esther Metting (UMCG - Netherlands)

Presenter: Esther Metting

Abstract

The EU stimulaties the Development and implementation of digital healthcare with eHealth programs and Grants. European countries should collaborate in the development of digital health. Moreover, crossborder healthcare use can improve health care accessibility of European citizens. Unfortunately, there is nothing known about cultural differences regarding technology acceptance.

Aim: Exploration of cultural differences in technology acceptance of patients. We performed 8 focus groups in the Netherlands, UK, Germany and Belgium with COPD patients. We used the Unified theory for technology acceptance as basis.

We included 61 patients (mean age 69 +/- 8 years, 46 % male). All patients considered the use of technology in healthcare unavoidable even if they did not use digital technology. Despite the fact that healthcare accessibility is a problem in all countries UK patients remained very positive about the NHS, whereas Dutch patients were very critical and worried about their healthcare system. Belgium patients were most experienced with digital health (Belgium: „When I have an appointment at 14.00 and at 18.00 I am still waiting, I'd rather have it online"). Dutch patients were least concerned about their privacy. In the UK and Belgium several patients mentioned that laziness was one of the barriers for using technology (UK: „ I am just lazy because my granddaughter, she is regulating that [technology]"). In all countries was the role of informal caregivers essential for digital support. In Germany patients would like to have more digital applications but healthcare organisations don't offer them yet.

This study clearly showed differences between the countries, not only reflecting different healthcare systems but also cultural believes. It is important to take these into account when developing and implementing crossborder digital health. The next step is to quantify these qualitative findings with questionnaires.

Enhancing Mental Resilience: Principles And Practices In eMental Health Program Development

Maaike Meurs (Therapieland - Netherlands), Eva van Beek (Therapieland - Netherlands)

Presenter: Maaike Meurs

Abstract

Background: Therapieland develops eHealth programs aimed at strengthening mental resilience. Central questions are in what ways individuals feel helped by eHealth programs and how we can enhance the likelihood of feeling helped.

Methods: Therapieland designs e-Health programs incorporating principles of positive psychology and co-creation with clients and healthcare professionals. Monthly, about 6500 professionals and 30.000 clients are actively using the Therapieland platform. Both qualitative (25 interviews) and quantitative research focus on identifying factors influencing clients' sense of feeling helped by the eHealth programs and offering the most suitable program for each individual.

Findings: Clients may feel helped in various ways by eHealth. Clients report not only a reduction in symptoms (24%), but also gaining new insights (61%) and better coping with symptoms/situations (41%). A proper fit between the client's needs of the intervention and a suitable intervention increases the likelihood of feeling helped by e-mental health programs. When clients' preference with regard to following programs guided by a professional or unguided matches the actual situation, they're feeling helped (range 0-10) to a significantly larger extent than if this doesn't match ("Match": M=6.6;SD=1.8;N=417, "Mismatch": M=6.2;SD=2.1;N=184; t=2.33; p=0.01). Furthermore, a linear regression model shows that adding the outcomes of a needs/preferences questionnaire instead of only using treatment as a predictor, demonstrates that incorporating needs can improve the prediction of helpfulness of a treatment (R2 treatment+needs=0.16; R2 treatment_only=0.04; N=1078).

Conclusion: Insights into the client's needs and combining this with the appropriate intervention enhances the likelihood of positive outcomes. Improved methods of assessing needs are required to enhance our ability to predict which program would be most beneficial for an individual.

Declaration of Conflict of Interest: Both authors are employees of Therapieland B.V

Contextual Inquiry For Knowledge Utilization And Dissemination Within The Metahealth Project.

Nymphaea Notschaele (Inholland University of applied sciences Inholland - Netherlands), Laurence Alpay (Inholland University of applied sciences - Netherlands), Lea Hohendorf (University of Twente - Netherlands)

Presenter: Nymphaea Notschaele

Abstract

Background: The METAHEALTH project aims at reducing obesity and caries in low socio-economic families by understanding the development of the microbiome in the first 1000 days of life. Microbiome plays a role in children's health and therefore information about microbiome should be integrated in resources covering health related topics for parent and professionals. To understand how this knowledge can be shared (via digital and non-digital means) we conducted a contextual inquiry.

Methods:
Stakeholder analysis: Stakeholders were interviewed in order to gain insights into their expertise, expectations and goals as well as finding out about the technologies they use or would like to use to communicate knowledge. Based on the data collected, a stakeholder map was created.
Customer Journey: Existing data set from six interviews collected from the Sarphati cohort study was used. The customer journey analysis involved mapping family interactions with information on children's health and professional care.

Findings: The stakeholder map shows different layers of relationships and delineates collaboration for knowledge dissemination. It unveiled technologies usage, including collaborative decision-making tools (e.g. Panel), websites, lesson kits, and open-source software. Issues raised from the interviews included for instance digital inclusion and the impact of interventions on existing health inequalities. The customer journey highlighted crucial phases triggering information-seeking behavior, such as pregnancy, delivery, maternity period, scheduled visits to the Child Consultation Clinic, birth defects, daycare, and milestones in a child's development. We identified trigger points and information patterns, revealing technologies usage.

Conclusions: Knowledge dissemination and utilization occurs both within and outside the scientific community. We aim to reach various target groups (e.g. health care professionals, parents, policy makers). Each group has its own needs and go-to platforms to help them make informed decisions. Next steps involve analyzing these platforms to identify effective strategies for information-sharing.

Evaluation Of Virtual Reality To Promote Enjoyment Of Life And Autonomy Of People With Dementia

Hilco Prins (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences, Zwolle - Netherlands), Anouk Jansen (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences, Zwolle - Netherlands), Charles Van Der Spek (Stichting Pelita, Diemen - Netherlands), Anjo Geluk (Denktank 60+ Noord / Raad van Ouderen, Steenwijk - Netherlands), Gabriëlle Ten Velde (Research group Health Innovations and Technology, Fontys University of Applied Sciences, Eindhoven - Netherlands), Rika Roffelsen (Netwerk Dementie Drenthe, Assen - Netherlands), Marike Hettinga (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences, Zwolle - Netherlands), Franka Bakker (Research group Living Well with Dementia, Windesheim University of Applied Sciences, Zwolle - Netherlands), Simone De Bruin (Research group Living Well with Dementia, Windesheim University of Applied Sciences, Zwolle - Netherlands)

Presenter: Hilco Prins

Abstract

Background: Dementia fear influences how people with dementia are cared for. In the VRbeelding project, researchers and citizens used the Photovoice method, Structured Interview Matrix and sounding board group meetings to convert fear images into virtual reality (VR) experience embedded in a training to promote enjoyment of life and autonomy of people with dementia. Target groups are informal caregivers, care students and professionals. A pilot study was conducted to evaluate the VR training.

Methods: We conducted pre- and post-test photo-elicitation interviews among six informal caregivers (with Dutch East Indies and Turkish roots), five healthcare students and four care professionals. Participants' insights into maintaining enjoyment of life and autonomy and implementation of the VR training were investigated.

Findings: Preliminary results show that informal caregivers with little experience became more aware of the effect of their own actions on people with dementia. For experienced informal caregivers, sharing events and emotions was valuable, especially in relation to their own resilience. Participants missed culturally sensitive elements in the VR scenario's. Students and care professionals felt that the training mainly confirmed the correctness of their approach. For some students it led to awareness of the importance of enjoyment of life and autonomy. Nevertheless, participants found the immersive form inspiring for novice students and caregivers. To embed the VR training in care education, place in curriculum, lesson format, assessment, experience and intrinsic motivation were found important. Care professionals found attention to customization, design of the training, purpose and implementation among informal caregivers important.

Conclusions: The VR training was seen as an inspiring form of learning. It can be used to raise awareness among novice students and informal caregivers about how to maintain enjoyment of life and autonomy for people with dementia. Resilience of informal caregivers and cultural sensitivity must be part of the training.

Catalyzing Validity Conversations In Serious Games For Health: Glyphs Of Yucatán

Hendrik Provily (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands), Thomas Huijser (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands), Leon Oost (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands), Haukje van der Veen (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands), Boudewijn Dijkstra (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands), Gido Hakvoort (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences, Zwolle - Netherlands), Derek Kuipers (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands)

Presenter: Hendrik Provily

Abstract

Background: Serious games developers (SGDs) often face difficulties in conveying the validation and potential impact of their applications to (potential) customers. This issue is especially prevalent in healthcare where clinical effectiveness, according to medical research paradigms (e.g. randomized controlled trials), is often inquired. Even though this approach is not feasible for SGDs, they do engage in demonstrating various forms of validity throughout their development process. SGDs however, struggle with effectively communicating these validities, which hinders constructive dialogues with potential customers. To address this challenge, the "Clash of the Paradigms: validation of serious games for health" project was initiated together with 11 SGDs. The project focuses on the development of boundary objects aimed at easing the validation communication problem.

Description: One of the boundary objects developed as part of the project is "Glyphs of Yucatán". This application is a word association game based on the game “Codenames”. Glyphs of Yucatán draws on the assumption that SGDs have set assumptions about design research validity which are either incorrect, inadequate, or not aligned within development teams resulting in misinterpretation and miscommunication. Within the game, players learn about design research validity and how others interpret this. In the game, players are presented a validity and will have to select corresponding concepts by jumping to the correct platforms before they disappear. The game ends when at least one player has correctly identified five corresponding concepts to a validity.

Practical Description of the Demonstration: The demonstration will start with a brief introduction of the overall project followed by an introduction of Glyphs of Yucatán. Participants will then have the opportunity to experience playing several rounds. This hands-on approach aims to showcase how SGDs can learn about design research validity and leverage this to have constructive dialogues about their serious games for health.

Assessing Health Technology Implementation: Support Tools For Awareness And Guidance: A Review

Meyke Roosink (University of Twente - Netherlands), Lisette Van Gemert - Pijnen (University of Twente - Netherlands), Ruud Verdaasdonk (University of Twente - Netherlands), Saskia Kelders (University of Twente - Netherlands)

Presenter: Meyke Roosink

Abstract

Background: For successful health technology innovation and implementation it is key to understand the problem and whether a proposed innovation is the best way to solve the problem. This review aimed to create an overview of different types of recently published tools that support innovators (and project/innovation managers) in academic and early development settings with awareness and guidance along the end-to-end process of development, evaluation and implementation of health technology innovations.

Methods: Tools were identified from scientific literature as well as in grey literature by non-systematic searches in public research databases and search engines, and based on expert referral. Tools were identified between March and August 2023.

Findings: A total number of 14 tools were included. Tools were classified as either readiness level tool (n=6), questionnaire/checklist tool (n=5) or guidance tool (n=3). Identified key domains included: 1) Understand the condition, user, organization, and healthcare system, 2) Develop health technology innovations that are legal, safe, ethical, and environmentally sustainable, 3) Develop (pre-)(clinical) evidence strategy, 4) Investigate economic aspects, and 5) Develop business model. Identified innovation phases included: 1) Conceptualization, 2) Concept Validation, 3) Development, 4) Market access & launch, 5) Post-market phase. In addition the following implementation principles could be identified: 1) Multidisciplinary development teams (including project management), 2) Continuous evaluation cycles, and 3) Development intertwined with implementation. All tools were mapped for (partially) addressing the identified domains, phases, and principles.

Conclusion: The present review provides awareness of available tools and considerations for tool selection and/or novel tool development. A remaining attention point for future studies is the validation and effectiveness of (self-assessment) tools, especially in the context of support preferences and available support alternatives. This review will be used to further develop the assessment and support of health technology innovation and implementation in academic research and early development settings.

Development Of A Machine-Learning Algorithm To Predict The Significane Of Scientific Articles For Drug-Disease Interactions

Emma de Ruiter (Health Base Foundation, Houten - Netherlands), Philippe Habets (EvidenceHunt, Amsterdam - Netherlands), David van Ijzendoorn (EvidenceHunt, Amsterdam - Netherlands), Kayan Tsoi (Health Base Foundation, Houten - Netherlands), Christiaan Vinkers (EvidenceHunt, Amsterdam - Netherlands), Sander Borgsteede (Health Base Foundation, Houten - Netherlands)

Presenter: Emma de Ruiter

Abstract

Background: To assess whether a drug-disease interaction is clinically relevant, an assessment report is composed by combining published scientific evidence with professional guidelines and manufacturer information. Therefore, pharmacist researchers perform a systematic literature search in a search engine (PubMed) to identify relevant scientific papers. The specificity of these searches is low and therefore time consuming: on average 1 out of 52 hits showed is included in the assessment report. The objective of this study was to evaluate whether a machine-learning model can increase specificity of PubMed searches without loss of sensitivity.

Methods: A pre-trained natural language processing transformer was fine-tuned to identify relevant entries based on training data supplied by research pharmacists. A total of 286 previously composed reports were labelled and split into case-control-balanced training set, validation, and test datasets. The model was trained by providing the relevant contraindication and intervention terms, as well as the title and abstract of each potentially relevant article. Each item in the training set was labeled '1' for articles included in the assessment report, and '0' when excluded. Two research pharmacists prospectively validated the model by comparison of manual and model-based PubMed hits after development of the model.

Findings: The machine-learning model was validated on an outheld test set of model-unseen reports to avoid double dipping. The model obtained an area under the sensitivity-versus-specificity curve of 0.91 (F1-score = 0.85). The prospective validation showed an increase in specificity, without loss of sensitivity. Using the model resulted in a time-reduction of 50-80% compared to manual selection of relevant articles.

Conclusion: This study shows that automated preselection of relevant studies using machine learning is possible without sacrificing sensitivity. An optimisation of the model to further increase specificity without reduction of sensitivity is recommended to further reduce the amount of irrelevant hits.

Synthetic Data To Enable Development Of Machine Learning Models For Healthcare

Levi Schilder (Isala & Windesheim - Netherlands), Gido Hakvoort (Windesheim - Netherlands), Brian Vendel (Isala - Netherlands), Joris van Dijk (Isala - Netherlands), Paul Hiemstra (Windesheim - Netherlands), Jorn van Dalen (Isala - Netherlands)

Presenter: Levi Schilder

Abstract

Background: Artificial Intelligence offers promising opportunities for innovating healthcare, yet its practical implementations remain limited. Two important reasons for this are strict legislation and the unavailability of data, partly due to patient privacy. Synthetic data (SD) could offer a solution to the latter. Synthetic data is a machine-learning (ML) technique that learns the distributions and correlations of a real dataset and generates a synthetic dataset with the same characteristics, without containing real (patient) data. This enables researchers to more freely share data for training ML-models. In this study, we investigate the effects of replacing real data with synthetic data on ML-model performance using tabular synthetic data generators.

Methods: A dataset for detecting prostate cancer metastases (N=561) was used. A classifier is trained on real and synthetic data. Three SD generators (CTGAN, CopulaGAN, TVAE) were used to train four ML-models (Random Forest, K-Nearest Neighbor, XGBoost and Logistic Regression). Model performance -and therefore SD utility- is measured using five metrics (Accuracy, ROC-AUC, F1-score, Sensitivity and Specificity).

Findings: On average, the models trained on SD perform relatively well, with an average F1-score of 0.869 for all generator/model combinations compared to 0.901 for models trained on real data. TVAE performs best, then CTGAN, followed by CopulaGAN. The highest F1-score observed is 0.929 for TVAE/Random Forest. The lowest is 0.748 for CTGAN/XGBoost. For the real data, this range is 0.832 to 0.940 for K-nearest neighbor and random forest respectively. Although SD performs well for most metrics, the specificity is unpredictable, averaging at 0.777 but ranging from 0.478 to 0.978.

Conclusion: On average, models trained on SD show a small decrease in performance, while preserving patient privacy. CTGAN and TVAE show better utility than CopulaGAN. The specificity shows inconsistent behaviour and should be considered when generating synthetic data.

The Importance Of Unravelling Thoughts: Personalized Experience Sampling Approaches

Michelle Servaas (University of Groningen, University Medical Center Groningen - Netherlands), Aliye Sayiner (MEF University - Turkey), Fetsje de Jong (University of Groningen, University Medical Center Groningen - Netherlands), Philip von Klipstein (University of Groningen - Netherlands), Moritz Hausmann (University of Groningen, University Medical Center Groningen - Netherlands), Date van der Veen (University of Groningen, University Medical Center Groningen - Netherlands), Robert Schoevers (University of Groningen, University Medical Center Groningen - Netherlands), Laura Bringmann (University of Groningen - Netherlands), Harriette Riese (University of Groningen, University Medical Center Groningen - Netherlands)

Presenter: Michelle Servaas

Abstract

Background: The aim of this presentation is twofold. First, I will present results on the Rigidity project wherein we investigated the presence of maladaptive thoughts (named rigidity) and their predictive value for the course of depressive symptoms. Second, I will present ideas on the DigiCGT project wherein we are developing a digital thought record and feedback module (named DigiCGT) in a web application named Personalized Treatment by Real-time Assessment (PETRA). PETRA is integrated into the electronic patient records of eight mental health institutions.

Methods: In the Rigidity project, we used data of the Therap-i study wherein personalized maladaptive thoughts and experienced stress were measured five times a day for eight weeks during psychological treatment in individuals with depression. Items were measured using an electronic diary via the Experience Sampling Method (ESM). Depressive symptom severity was assessed several times, namely before and during ESM and a follow-up period of six months.

In the DigiCGT project, the first aim is to design and implement a digital thought record and feedback module in PETRA through co-design with patients and their significant others, and clinicians. The second aim is to conduct a pilot study to evaluate the DigiCGT module in clinical practice with patients and clinicians.

Findings: The results of the Rigidity project showed a significant positive relationship between rigidity, and experienced stress and the severity of depressive symptoms. Furthermore, rigidity predicted the severity of depressive symptoms over a period of 8 months.

Conclusion: Rigidity in maladaptive thoughts is an informative concept on the course of depressive symptoms over a period of eight months. Besides quantitative data on the presence of maladaptive thoughts, it is also important to obtain qualitative data on thoughts, emotions and context to unravel the patient's psychopathology in daily life during psychological treatment, thereby stimulating shared-decision-making and empowerment.

Identifying User Types In Interaction With Smartphone-Based Interventions.

Aniek Siezenga (Max Planck Institute for the study of Crime, Security and Law, Freiburg im Breisgau; Leiden University, Leiden - Germany), Esther Mertens (Leiden University, Leiden - Netherlands), Jean-Louis Van Gelder (Max Planck Institute for the study of Crime, Security and Law, Freiburg im Breisgau; Leiden University, Leiden - Germany)

Presenter: Aniek Siezenga

Abstract

Background: Smartphone-based applications designed to modify and improve the user's behavior are becoming more prevalent. These "app" interventions offer constant accessibility, support when needed, and scalability, which can reduce the burden on the mental health care system. Despite these advantages, not all users benefit equally from app interventions. This may be due to differences in users' app engagement and app use (hereafter: app interaction). To inform future research and app development, we need to improve our understanding of how different user types interact with app interventions. Therefore, our study explored: 1) whether distinct user types can be identified based on their interaction (i.e., engagement and use) with an app intervention, and whether these user types differ in 2) intervention effects, and 3) individual characteristics (i.e., personality traits and self-efficacy).

Methods: We used data from two randomized controlled trials (N = 86 & N = 106) testing the effectiveness of an app intervention, FutureU. We applied k-means++ cluster analyses to identify user types. Linear discriminant analyses, ANCOVAs and MANOVAs were used to explore the relationship between the user types, intervention outcomes, and user background characteristics.

Findings: We identified four distinguishable user types: High engagement-High use, High engagement-Low use, Low engagement-High use, and Low engagement-Low use. In general, the intervention showed the strongest effects for the High engagement-High use and High engagement-Low use user types. There were no significant differences in individual characteristics between the identified user types.

Conclusion: Our findings highlight the different ways in which users interact with app interventions, which can result in different intervention effects. I will discuss the implications of our findings for research and app development.

Extracting The Gait Fingerprint - A Sensitive Tool To Personalize Gait Rehabilitation?

David Sina (Vrije Universiteit Amsterdam - Netherlands), Sonja Georgievska (Netherlands eScience Center - Netherlands), Cunliang Geng (Netherlands eScience Center - Netherlands), Yang Liu (Netherlands eScience Center - Netherlands), Michiel Punt (Netherlands eScience Center - Netherlands)

Presenter: David Sina

Abstract

Human gait is highly individual just like a fingerprint. A gait pattern results from a complex interaction of several body parts, orchestrated by the (central) nervous system that controls the active and passive systems of the body. An impairment of gait due to a stroke results in a decline in quality of life and independence. Setting up efficient gait training requires an objective and wholesome assessment of the patient's movement pattern to target individual gait alterations.

Current assessment tools are limited in their ability to capture the complexity of the movement and the amount of data acquired during gait analysis. This study aimed to investigate the ability of variational autoencoders (VAE) to learn and recognize different gait patterns within both, pathologic and healthy gait. For this purpose, the lower-limb joint angles of 71 participants (29 stroke survivors, 42 healthy controls) were used to train and test a VAE. The VAE reduced the complexity of the input to only 3 latent features.

The good reconstruction results (range $r = 0.52 – 0.91$, average normalized RMSE 23.36 % ± 4.13) indicate that VAEs can be used to assess gait data in an objective and holistic manner, thereby integrating the individual characteristics of each person's gait, making it a promising tool to monitor the progress of rehabilitation efforts.

Wacht@Ctief: Reducing The Burden Of Waiting Lists For Mental Health Care

Christien Slofstra (Center for Integrative Psychiatry, Lentis, Groningen - Netherlands), Chantal van der Werf (Center for Integrative Psychiatry, Lentis, Groningen - Netherlands), Katharina Gozdzik (Center for Integrative Psychiatry, Lentis, Groningen - Netherlands), Thomas van Hoorn (iLentis, Lentis, Groningen - Netherlands), Rogier Hoenders (Center for Integrative Psychiatry, Lentis, Groningen - Netherlands), Sanne Booij (Center for Integrative Psychiatry, Lentis, Groningen - Netherlands)

Presenter: Christien Slofstra

Abstract

Background: Waiting lists for mental healthcare (MHC) in the Netherlands are often too long. Waiting times result in an additional burden for individuals with mental health care needs, their loved ones, referrers and MHC practitioners. Wacht@ctief aims to reduce these negative consequences and to facilitate a better start of treatment. Wacht@ctief is an eHealth program that has been developed within Lentis for people with mental health problems, who are waiting for intake.

Wacht@ctief is currently being further developed, upscaled and evaluated amongst ten pilot departments using action research. It is hypothesized that developing Wacht@ctief based on the needs of all different stakeholders, namely individuals with mental health care needs, their loved ones, the referrers and MHC practitioners, will result in the best mitigation of the burden of waiting lists for primarily individuals with MHC needs and, secondarily, the other stakeholders.

Methods: How waiting lists are experienced and what the needs are of individuals who are waiting for intake, their loved ones, referrers and mental health care practitioners was examined using qualitative interviews with all these stakeholders.

Findings: All stakeholders suffer from the (too) long waiting list and see potential for eHealth mitigating the burden, if eHealth is (minimally) supported. All express a need for better communication about the waiting times amongst the different stakeholders. To facilitate a better start of treatment for users and MHC practitioners, a personal memo for users about their progress has been developed in Wacht@ctief, that they can transfer to the intake.

Conclusion: Broadening the scope from end-users (individuals who are waiting for intake) to other stakeholders (their loved ones, referrers and MHC practitioners) has elucidated the extend of the burden of MHC waiting lists and has unearthed several opportunities and barriers to improve Wacht@ctief.

Exploring Public Concerns On The Use Of Artificial Intelligence In Healthcare

Sara Soriano Longarón (UMCG - Netherlands), Jacobien Niebuur (UMCG - Netherlands), Maya J. Schroevers (UMCG - Netherlands), Mirjam Plantinga (UMCG - Netherlands), Adelita V. Ranchor (UMCG - Netherlands)

Presenter: Sara Soriano Longarón

Abstract

Background: Artificial Intelligence (AI) has the potential to revolutionize healthcare and enhance patient outcomes. Addressing the public concerns towards AI is crucial for its appropriate development and implementation. Concerns include trustworthiness of AI, data privacy or accuracy of AI results. The public concerns might depend on the different AI applications and/or on the different developmental stages of AI in healthcare. We aim to investigate the level of concerns towards the use of AI 1) within and across different AI healthcare applications, and 2) across different developmental stages of AI.

Methods: A cross-sectional online survey study involving 1,250 participants from the Netherlands will be conducted in April 2024 using Flycatcher survey sampling company. Dutch-speaking participants will be randomly assigned to different real life AI applications within healthcare. The AI applications involve newborn screening, chatbots supporting doctor-patient communication, augmentation of data for AI training in imaging, and preventive interventions through wearables. This last one will be divided into three developmental stages: data availability, use, and performance. Each AI application and developmental stage will be explained to participants in plain language. Afterwards they will express their levels of concern towards these AI applications.

Findings: Mean and standard deviations will be calculated to describe the level of concerns. ANOVA will be used to compare within and across AI applications and developmental stages. We hypothesize that all concerns will be present at some level, but they will vary across AI applications and developmental stages.

Conclusion: The results from this research will contribute to human-centered AI development by identifying relevant concerns to consider when developing and implementing AI applications in healthcare.

A Randomized Controlled Trial On The Efficacy And Safety Of The Untire App For Moderate-To-Severe Cancer-Related Fatigue In German Patients

Simon Spahrkäs (Tired of Cancer - Netherlands), Fatemeh Akbari (Tired of Cancer - Netherlands), Katharina Abrahams (THINC, The Healthcare Innovation Center, University Medical Center Utrecht - Netherlands), Zenner Hans-Peter (Comprehensive Cancer Center Tübingen-Stuttgart - Germany), Hans Reitsma (University Medical Center Utrecht - Netherlands), Bram Kuiper (Tired of Cancer - Netherlands), Ewoud Schuit (University Medical Center Utrecht - Netherlands)

Presenter: Simon Spahrkäs

Abstract

Background: This RCT examined the clinical efficacy and safety of the German language version of the Untire app digital health application (i.e., DiGA) in reducing fatigue and enhancing quality of life among cancer patients. The hypothesis was that supplementing care-as-usual with the app access would yield superior outcomes for patients suffering from moderate to severe fatigue over 12 weeks.

Methods: Patients with moderate to severe cancer-related fatigue (CRF) were recruited via newspaper and social media advertisements throughout Germany and randomized (1:1) to care-as-usual (n=111) or care-as-usual plus Untire app (n=104). Baseline, 4, 8, and 12-week assessments included fatigue, quality of life, stress, depression, and anxiety. Linear mixed models ANCOVAs examined 12-week treatment effects, adjusting for baseline values within intention-to-treat.

Results: By week 12, the intervention group showed significantly reduced fatigue ($p=0.0016$, $d = 0.47$), exceeding the clinically relevant minimal clinically important difference (MCID: -0.57). Disease-related quality of life also significantly improved ($p=0.0178$, $d = 0.35$). Subgroup and sensitivity analyses supported consistent treatment effects and robustness.

Discussion: This study confirms the German Untire app's efficacy and safety in reducing fatigue and improving quality of life among cancer patients and survivors with moderate to severe fatigue. Subgroup analyses indicate consistent treatment effects regardless of app engagement or demographic characteristics.

Conclusion: The German Untire app proves effective and safe for moderate to severe cancer-related fatigue.

Virtual Reality (VR) Training For Ambulance Staff (Project VRAMBO): A Feasibility Study

Ivan Steenstra (Hanze Hogeschool - Netherlands), Daan Tuinstra (Hanze Hogeschool - Netherlands), Rik Boer (Hanze Hogeschool - Netherlands), Bram Oosting (Hanze Hogeschool - Netherlands)

Presenter: Ivan Steenstra

Abstract

Ambulance nurses are highly skilled professionals who provide life-saving measures in the event of serious accidents. Their work is often under time pressure and characterized by a high degree of unpredictability. Complex emergency situations are difficult to put into protocols and it is expensive to create adequate training situations. As a result, ambulance nurses often are and/or do not feel optimally prepared to do their job.

The experiences and needs of these specialized nurses form the starting point of this project. The goal was to design and evaluate an innovative VR training that meets the educational needs of these higher professional education professionals.

Not only has the professional field been extensively consulted, but in the long run-up to this application, students have also carried out research and design projects, in which valuable knowledge has been gained.

The project involved extensive involvement from the field, in a participatory and iterative manner, to design an innovative training method including VR experience to train complex situations. Input from the field continuously controls the process and user-centered VR training is guaranteed.

The project consists of three phases: through 1) literature and context research into the core diagnostic issues and required VR properties, 2) creating and selecting promising VR training concepts in a co-creative manner and 3) designing an advanced prototype which was evaluated in two field trials with ambulance nurses. Another guiding element within this project is the likelihood of implementation after the end of the project; a substantial part of the project is focused on research for an implementation roadmap.

Evaluation of the developed prototype has shown that VR-based training is feasible and acceptable for the target group. A full training needs to be developed and evaluated. Embedding the VR Training in existing training systems, procedures and accreditation should be explored to implement the final training successfully. The training prototype is available for conference participants to experience first hand.

Development Of Personas To Support Medication Adherence In Hypertense Patients Using Quantitative Methods

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Presenter: Emanuele Tauro

Abstract

Background: Low medication adherence is identified by the WHO as one of the main causes of increased hospitalization and mortality in chronic patients. Persuasive System Design techniques, such as Personas, can be used to increase engagement of patients by supporting the design of tailored interventions and messages. Thus, the aim of this study is to develop Personas of chronic patients affected by hypertension.

Methods: 200 individuals with self-reported hypertension participated in the study, completing a web survey composed of validated questionnaires that covered domains such as socio-demographic, physical health, perception and usage of medication and psychological and emotional factors. Dimensionality reduction methods were tested: Principal Component Analysis (PCA), Principal Component Analysis of MIXed data (PCAMIX), Factor Analysis of Mixed Data (FAMD) and Gower's distance (GW), both weighted and not. K-Medoids Clustering with Partitioning Around Medoids algorithm was performed for all preprocessing methods; and the optimal number of clusters and dimensionality reduction method were evaluated through average silhouette graph, percentage of statistically different attributes between Persona and the total within sum of square distances index. Finally, Persona cards were built to summarize the main associated features.

Findings: The optimal preprocessing method was identified as PCA with weights with K=3 clusters. The first Persona was the most adherent, characterized by high health literacy, medium relationship with their physician and low risk of anxiety and depression. The second Persona presented medium adherence, best relationship with their physicians, high literacy and low risk of anxiety and depression. The third Persona represented those with lowest adherence, eHealth literacy, relationship with physicians and higher risk of anxiety and depression.

Discussion: The obtained Personas are capable of stratifying the features that characterize medication adherence in chronic patients. These Personas can be used to personalize messages tailored towards the requirement of individuals to increase their adherence to therapies.

Comparative Analysis Of State-Of-The-Art Automatic Speech Recognition Systems For Transcribing Medical Consultation Audio Recordings

Cristian Tejedor-García (Radboud University, Nijmegen - Netherlands), Henk van den Heuvel (Radboud University, Nijmegen - Netherlands), Arjan van Hessen (University of Twente, Twente - Netherlands), Sandra van Dulmen (Nivel, Utrecht - Netherlands), Pieters Toine (Universiteit Utrecht - Netherlands)

Presenter: Cristian Tejedor-García

Abstract

Background: This study addresses the need for accurate transcriptions of medical consultations using state-of-the-art (SOTA) open-source automatic speech recognition (ASR) systems. Efficient and secure speech-to-text conversion is crucial in healthcare for improved medical documentation, research facilitation, and patient confidentiality. The research compares the performance of two ASR systems, Kaldi_NL and Whisper, in transcribing Dutch clinical institute consultations under the HoMed project. The evaluation seeks to provide valuable insights into technologically advanced healthcare solutions.

Methods: The experiment utilized an exceptionally challenging test dataset (low audio quality, background noise and technical jargon) comprising 9.9 hours of speech from real medical consultations in the Netherlands, accessible at the Nivel institute in Utrecht. The study employed two versions of Kaldi_NL ASR system (generic and fine-tuned) and Whisper as the chosen ASR systems. Methodological considerations included assessing word error rate (WER), correct word rate (CWR), and overall performance. The analysis aimed to provide a comprehensive understanding of each system's transcription capabilities in a real-world medical context.

Findings: The results indicate that Whisper outperformed the other alternatives, obtaining the lowest WER (57.1%), in comparison with the generic version of Kaldi_NL (71.2%) and the finetuned one (68.0%); and the highest CWR (58.7%) in comparison to Kaldi_NL (30.2%) and the finetuned Kaldi version (33.5%). These findings contribute valuable information for healthcare professionals and technologists seeking effective ASR solutions for transcribing sensitive medical consultations.

Conclusions: In this work, we have demonstrated that Whisper is a SOTA open-source ASR system which offers a better performance for transcribing medical consultations of speech recordings in Dutch than Kaldi_NL. However, the realistic conditions of the consultations create an adversarial and challenging application field that should be further explored to improve the final performance. Furthermore, more data should be employed to fine-tune these systems with medical domain-specific speech data to enhance accuracy further.

User-Friendliness Of The Picterus® Jaundice Pro Application

Frouke Terpstra (UMCG, Groningen - Netherlands), Tjalling de Vries (Retired (formerly affiliated with MCL, Leeuwarden) - Netherlands), Elisabeth Kooi (UMCG, Groningen - Netherlands), Jasper Been (Erasmus MC, Rotterdam - Netherlands), Peter Dijk (UMCG, Groningen - Netherlands), Christian Hulzebos (UMCG, Groningen - Netherlands)

Presenter: Frouke Terpstra

Abstract

Background: The Picterus® Jaundice Pro application is a mobile health app developed to detect neonatal hyperbilirubinemia. It has recently been developed for use by healthcare professionals. Parental application of the Picterus® app could allow for earlier detection of imminent severe neonatal jaundice. Yet, the usability and user-friendliness of the Picterus® app when used by parents is still unknown.

Objective: to determine usability and user-friendliness of the Picterus® app as tested by parents.

Methods: We conducted a prospective mixed-methods study at the maternity wards of two hospitals. All term-born infants admitted for maternal or paediatric reasons for more than 12 hours, with at least one Dutch-speaking parent, were eligible for inclusion. Sixty-two parents gave informed consent for participation. They received instructions on how to use the Picterus® app in the first postnatal week and used the app once on their newborn infant. Afterwards they answered all statements of the mHealth App Usability Questionnaire (MAUQ). MAUQ is a validated mobile-health usability questionnaire with 18 statements in three subcategories: ease of use, interface & satisfaction and usefulness (scores: 1 – 7). A median score of ≥ 5 was defined as sufficiently usable. Additionally, parents were asked open-ended questions.

Findings: Median [IQR] score of all the MAUQ subcategories was 6 [5-7]. Most parents (79%) said they would use Picterus® app at home. Parents reported they found the app easy, quick and convenient, although 35 parents (56%) reported that the app failed on the first try. When asked, these parents responded they struggled to find the instructions menu or did not know how to interpret instructive messages within the application.

Conclusion: Parents judged the Picterus® app as usable and user-friendly, despite a notably high failure rate on the first try. Technical adjustments or more detailed education seem essential to facilitate parental use of the Picterus® app in health care systems.

It's All About Words: An Exploratory Study On Utilization Of Technology-Based-Simulation-Learning To Support Healthcare Internships

Jolanda van Til (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Fenne Verhoeven (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Anouk Jansen (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Iris Zwart (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Marike Hettinga (Research group IT innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands)

Presenter: Jolanda van Til

Abstract

Background: The emergence of Technology Based Simulation Learning (TBSL), for example immersive rooms, can be of significant value in creating more internships within healthcare organizations. Students can start their internships more thoroughly equipped. Through an exploratory study, we investigated the role that TBSL can play in creating adequate learning and workplace environments in healthcare education and practice.

Methods: The research took place between April and December 2023 and consisted of two activities:

1. Four semi-structured focus group meetings (1.5 hours) with participants from education (n= 10), work field (n= 6) and students (n= 5). Two researchers conducted inductive thematic analysis;
2. Developing a network map to visualize existing TBSL-initiatives in Zwolle region.A validation session with experts took place in December 2023.

Findings: During focus groups, the underlying question was discussed whether there are actually insufficient internships or whether supervising students takes too much time and therefore there are fewer internships. It appeared the latter was the case, and therefore TBSL could be of added value. For first-year students it seems that TBSL prepares them for the realities of practice. TBSL also seems to be suitable for teaching instrumental-technical operations, communication skills, and clinical reasoning. It creates a safe environment for learning and increases motivation to learn. Almost all vocational schools in Zwolle Region appeared to have the ambition to start (or expand) working with TBSL. Interorganizational cooperation is desirable to align content of TBSL and logistics.

Discussion: A shared understanding of the internship shortage-problem is important to determine how TBSL can contribute to healthcare education. It is up to vocational education organizations in Regio Zwolle and the professional healthcare field to realize a joint vocabulary, so 'profit' can be gained by deploying TBSL. In our future research, stakeholders will explore together where collaboration can most easily be initiated.

Personalised Information Presentation Profiles To Empower Patients With Breast Cancer

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Presenter: Lianne Tolboom

Abstract

Background: Inadequate health information can lead to significant mood issues, skewed risk perception, decision regrets, and reduced quality of life. Tailoring to individual informational needs can enhance accessibility and empower patients. This study aims to identify digital presentation preferences and patient profiles in patients with (a history of) breast cancer to achieve personalization of the information presentation irrespective of the contents.

Methods: In end 2023, we distributed a digital questionnaire about demographics, decision-making style, digital health literacy, attitude towards digital information and information presentation preferences amongst Dutch female patients with (a history of) breast cancer. Profiles were determined using the ranked preferences for information presentation. Based on the questions about navigation, amount of information, text and image format and representation of patient perspective, the reciprocal rank weighted distance was calculated to determine the similarity of preferences of patients. Agglomerative hierarchical clustering was limited to a maximum of three profiles for practical feasibility of future implementation in digital platforms.

Findings: We received 278 responses (56±10 years old, diagnosed between 1996 and 2023, 45% were under treatment, 46% make decisions by themselves and 29% decided with their physician, digital health literacy mostly moderate to high). Of our respondents, 93% expressed the importance of being informed and 88% recognized the potential of personalized information presentation. Preference analysis revealed three profiles showing variation in: the amount of desired information, the number of hyperlinks to related content, the type of image, structure of text, patient experiences presentation, options to receive more information and navigational structure.

Conclusion: Our study showed a positive attitude of patients towards information personalization and large variation in information preferences. Implementing the three preference profiles could enhance digital information and thereby improve patient knowledge and potentially empower them to participate in the shared decision-making process.

Explainable Machine Learning For The Classification Of Movement Disorders: Distinguishing Tremor And Myoclonus

Elina van den Brandhof (University Medical Center Groningen, Groningen and University of Groningen, Groningen - Netherlands), Inge Tuitert (University Medical Center Groningen, Groningen and NHL Stenden University of Applied Sciences, Leeuwarden - Netherlands), Michael Biehl (University of Groningen, Groningen and University of Birmingham, Birmingham - Netherlands), Marina Tijssen (University Medical Center Groningen, Groningen - Netherlands)

Presenter: Inge Tuitert

Abstract

Background: Hyperkinetic movement disorders, such as essential tremor (ET) and cortical myoclonus (CM), pose significant challenges in clinical diagnosis and treatment due to their shared symptomatology and overlapping presentations. Accurate phenotyping of ET and CM is crucial and primarily relies on clinical presentation, which is difficult as indicated by large inter- and intra-observer variability. Our goal is to develop a machine learning based approach using accelerometry data to provide a proof of concept for distinguishing between ET and CM.

Methods: Accelerometry data was collected of 19 ET and 19 CM patients performing 21 upper body tasks using eight sensors. The phenotype classification was performed using the explainable machine learning method generalized matrix learning vector quantization (GMLVQ), which was applied to the power spectrum derived from the accelerometry data. GMLVQ provides a general classification performance and information on the decisions made identifying distinct patterns in the phenotypes.

Findings: Our results provided proof of concept for a classification system to differentiate between ET and CM using GMLVQ on the power spectrum derived from accelerometry data. Excellent classification results were achieved for postural and dynamic tasks, with areas under the receiver operator characteristic close to 1,0. For the classification, GMLVQ considered the overall shape of the power spectrum, where the frequencies 5-7 Hz as well as 3-4 and 9-10 Hz were of particular importance. These frequencies correspond to the tremor peak and local minima that are also reported in the literature.

Conclusion: The classification of ET and CM is feasible by applying GMLVQ to the power spectrum derived from accelerometry data, as indicated by the excellent classification results. This could potentially help clinical specialists with faster and more accurate phenotyping and a shorter time to treatment.

From Crisis To Connection: Evaluating The Legacy Of Covid-19 On Technology Adoption And Social Interactions In Elder Care Homes

Ans Tummers-Heemels (University or Technology Eindhoven - Netherlands), Emma Hongens (University of Technology Eindhoven - Netherlands), Rens brankaert (University of Technology Eindhoven - Netherlands), Wijnand IJsselsteijn (University of Technology Eindhoven - Netherlands)

Presenter: Ans Tummers-Heemels

Abstract

Background: The outbreak of the Covid-19 pandemic, over three years ago, has had an enormous impact on society and disproportionally affected older people in care homes. The pandemic appeared to be a watershed moment in relation to the use of social technologies, with expectations of a "new normal" where technology-mediated interactions would become commonplace. This study delves into the post-pandemic effects on elder care, focusing on maintaining social connections and emotional well-being through technology.

Methods: We performed an online survey with 35 elder care staff in the Netherlands, building on previous research to gauge changes in residents' emotions, social contact, technology attitudes, and care staff experiences. Responses included quantitative ratings and open-ended feedback, analyzed thematically.

Findings: Social technologies, such as video-calling, haven't been systematically supported in most places. Barriers in lasting technology adoption include usability issues, digital literacy, as well as challenges in integrating technology in the day-to-day workflow. "The use of technology should be easier for the staff, the family and friends".A positive outcome of the pandemic, care staff indicated that the person with dementia is more than ever considered center stage and, in general, a more personalized approach seems to be the key to warm contemporary dementia care. "It is nice to see that the special attention for the person with dementia, focused one-on-one". Nevertheless, some care professionals expressed ongoing concerns about the potential recurrence of a pandemic and its associated loss of life.

Conclusion: In conclusion, the pandemic prompted a quick pivot to social technologies in elder care, but many implementations were temporary fixes rather than lasting changes. Feedback from care professionals emphasizes the need to align technology with the nuanced needs of residents and staff, addressing usability, digital literacy, and workflow considerations to benefit from digital advancements in care settings.

An Application For Technology-Supported Shared Decision-Making In COPD

Roswita Vaseur (University of Twente, Biomedical Signals and Systems group - Netherlands), Tessa Beinema (University of Twente, Human-Media Interaction group - Netherlands), Wendy d'Hollosy (University of Twente, Biomedical Signals and Systems group - Netherlands), Danae Lekka (Innovation Sprint - Belgium), Monique Tabak (University of Twente, Biomedical Signals and Systems group - Netherlands)

Presenter: Roswita Vaseur

Abstract

Background: Shared decision making (SDM) is rarely employed in standard clinical practice, being implemented in just 10% of health-related decisions for chronic conditions.

Objective: To design and develop an eHealth application with an integrated SDM process to assist patients with chronic obstructive pulmonary disease (COPD) and comorbidities, and the healthcare professional (HCP) in SDM for supporting a healthy lifestyle.

Method: The ideation, specification, realization, and user evaluation phases of the Creative Technology Design Process (Mader et al. 2014) were applied to develop an application to support SDM. During the ideation phase, several concepts were generated. The selected final concept was refined adhering to requirements established in the specification phase. Requirements were defined based on the 10 SDM elements defined by Clayman et al. (2012) and by focus group sessions with patients and HCPs. During the realization phase, the final concept was implemented, resulting in an application to for technology supported SDM.

Result: The focus groups revealed that patients (n=10) prioritize time management, preparation, information provision, SDM roles, and goal-setting in the SDM process. HCPs (n=21) emphasized that SDM applications should be informative, offer guidance and support, and empower patients to make decisions autonomously. The final eHealth application, incorporating a SDM process, structurally guides the HCP and patient to decide together on: (1) a health domain (e.g. physical activity), (2) a long-term goal considering patient's preferences and values, and (3) a performance goal considering patient's their self-efficacy and expectations based on the selected domain.

Conclusion: Next, we will evaluate the application's usability through various tasks before actual implementation in a larger clinical trial. For that we hypothesize that patient's and HCP can enhance their communication and collaboration by leveraging a SDM application, and that this could lead to more informed and patient-centred decisions.

Personal Health Records In Hospital Care: Quantitative And Qualitative Evaluation Of Patients' Expectations And User-Experiences

Chiem Tuil (NHL Stenden Hogeschool - Netherlands), Irene Witteveen (NHL Stenden Hogeschool - Netherlands), Joke Anna Loonstra (MCL Medical Centre Leeuwarden) - Netherlands), Job van 't veer (NHL Stenden Hogeschool - Netherlands)

Presenter: Job van 't Veer

Abstract

Background: A PHR is a personal (digital) health record in which patients can examine their own health-data and can self-manage their healthcare process, making informed decisions together with healthcare providers. However, PHRs are not yet widely implemented, and little is known what behavioral determinants influence patients' use of PHRs. As part of an elaborate, multi-year project on developing PHRs for hospital-care, we examined patients' expectations and user-experiences of PHR-use in a Dutch (rural) hospital.

Methods: During the period januari 2023 until march 2024, we asked patients (just starting treatment) to join our pilot-study. 22 oncology patients and 28 rheumatology patients completed pre-pilot measurements. Follow-up measurements (after approx. 6-8 weeks) were completed by 8 and 15 respectively (pre-liminary; still collecting data). Using the Technology Acceptance Model (TAM), we examined expected and experienced usefulness (insight in personal health-situation, being informed before/after consults, assistance in decision-making/setting health-goals) and easy-of-use (finding info, use of additional functionalities) in semi-structured interviews.

Findings: Generally, patients were comfortable with how information is provided in the pre-PHR setting: before, during and after consults, patients generally feel attended to adequately. Nonetheless, expectations of PHR-use remained high; especially about keeping info in just one place, about avoiding to repeat one's story by sharing info with professionals and about PHRs helping in decision-making and goal-setting. Post-measurements show only a small population started using PHRs, despite an elaborate campaign to stimulate use. Patients with actually PHR user-experiences generally appreciated aforementioned PHR-functionalities. However, non-users report that the signing-up process was too challenging, and PHRs offer no convincing benefits compared to the pre-PHR setting.

Discussion: Despite generally positive expectations about PHR-use, actual uptake remains slow; even among rather ehealth-literate populations. Much effort is needed to facilitate PHR-use, with professionals making it integral part of their healthcare process and emphasizing its most obvious benefits.

Using Bedsensor Technology Supporting Nursing-Home Professionals During Nightshifts

Job van 't Veer (NHL Stenden Hogeschool - Netherlands), Chiem Tuil (NHL Stenden Hogeschool - Netherlands)

Presenter: Job van 't Veer

Abstract

Background: In nursing homes, professionals often experience the nightshift as busy and stressful. Increasingly, innovations such as ambient assisting sensor technology support nurses in monitoring clients. It enables professionals to decrease routine checks, to avoid disturbing sleeping clients, and to assess potential risky situations more accurately. While many systems hit the market, it is necessary to systematically evaluate how these systems fit the needs of professionals and residents; more specifically, how they can increase quality of care for residents and professionals' work efficiency.

Methods: We conducted 5 pilot studies in 3 large nursing homes (late 2022 until, late 2023), using the same bedsensor system (Momo Bedsense). In 5 pilots (approx. 12 weeks runtime each, we conducted structured observations (n=28) and semi-structured interviews (n=36) to evaluate developments in efficiency (number of (un)necessary checks and actions, reduced workload-peaks, workload experiences) and quality of care (number of disturbances, assessed sleep-quality, time reserved for patient centered care). Additional quantitative data on efficiency parameters was provided by company involved.

Findings: Pre-pilot measurements show high expectations about benefits (efficiency, quality of care) of the system. Though these expectations were not fully met, nurses reported significant improvements in quality of care (disturbances in residents' sleep almost reduced to none) in subsequent measurements. Nurses report clear differences in reduced workload (unnecessary checks and actions almost reduced to none) and significantly less unpredictability in acute situations. This was confirmed by observations and quantitative system data.

Conclusion: Generally, the sensor system significantly increased efficiency in the night shifts, with professionals experiencing less workload and less unpredictability. Quality of care increased; clients slept better, which improved their mood and physical activity during daytime. Future research should focus on how professionals learn to recognize specific client behavior patterns from system data, to improve patient-centered care.

Relevance Of Customer-Developer Collaboration In Developing Serious Games For Nursing Education: A Retrospective Case Study

Fenne Verhoeven (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Wouter Keuning (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Anouk Jansen (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Gido Hakvoort (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Marike Hettinga (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences - Netherlands), Boudewijn Dijkstra (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences, - Netherlands), Derek Kuipers (Professorship Design Driven Innovation & Serious Gaming, NHL Stenden University of Applied Sciences - Netherlands), Teun Aalbers (Gainplay Studio - Netherlands), Jan Jonk (Gainplay Studio - Netherlands), Wim Trooster (Team Educational Consultants, Windesheim University of Applied Sciences - Netherlands), Iris Zwart (Bachelor of Nursing, Windesheim University of Applied Sciences - Netherlands)

Presenter: Fenne Verhoeven

Abstract

Background: The growing range of serious games for health and their evaluation studies emphasizes their potential, also for nursing education. However, nurse educators struggle with how and where to start when thinking about implementing serious games in their own curriculum, because existing serious-game-implementation-frameworks are rather abstract. Through a retrospective case study on NursInVR, a serious game on clinical reasoning for nursing students, we documented a good practice, aiming to offer valuable insights and guidance to educators and researchers.

Methods: Two-hour online semi-structured interviews with developer (n=2) and customer (n=2) were conducted on April 17th and 20th, 2023. Thematic analysis by two researchers was followed by an online validation session with customer and developer on May 17th, 2023. Our case study generated a detailed timeline of NursInVR's development process, accessible in Miro format and clickable PDF.

Findings: NursInVR appeared to be successful since it covered all dimensions of the Context, Intervention, Mechanisms, Outcome-(CIMO)framework, showing constructive alignment between nursing content, didactics, and game technology. Also, curriculum integration was carefully planned.

However, even more valuable elements contributing to the game's success involved:

1. Complementary expertise of customer (education and healthcare) and developer (game technology);
2. Readiness to learn: weekly hour-long sessions facilitating mutual learning (client on VR-technology and game mechanics, developer on clinical reasoning);
3. Emergence of a shared language.

Discussion: Success in serious game development for nurse education requires more than following a framework; it demands significant time investment to foster shared understanding among customer and developer. Our NursInVR case offers practical insights on how, where, and when to stimulate constructive collaboration and shared understanding during the entire game development process, complementary to existing frameworks. Our future research will include both retrospective and prospective case studies to develop boundary objects, enhancing shared understanding between customers and developers.

User Satisfaction Of A Free Online STD/HIV Testing Service: Qualitative Findings

Koenraad Vermey (Aidsfonds - Soa Aids Nederland - Netherlands)

Presenter: Koenraad Vermey

Abstract

Background: Since 2008 a service for online testing of sexually transmitted diseases (STDS) including HIV has been operational in the Netherlands. Several public healthcare organizations collaborate to provide this service, which provides free STD/HIV testing for at-risk groups through an online mediated service. The service aims to reduce the burden on sexual health clinics and increase the uptake of STD screening in key populations, i.e. men who have sex with men and transgender people. However the system is under stress due to limited financial resources and increasing demand for the service. In order to assess if the testing service is meeting the needs of current users and if the service is a best practice for future innovative testing services, a qualitative research was set up.

Methods: Semi-structured interviews were conducted with 24 users of the testing service across the Netherlands. Participants were interviewed in-depth about their experiences during each step of the testing procedure and asked how the service should be improved in the future.

Findings: In general participants were very positive about the testing service, each step of the process was considered sufficiently clear and was generally meeting individual needs. Participants would like to see PrEP care for HIV prevention to be included. Many faced and struggled with the limited testing capacity, due to a lack of affordable comprehensive testing alternatives. Although the service is currently for free, participants were willing to contribute financially by paying an amount per test. Participants would rather contribute to the test than being limited to a maximum amount of tests per year.

Conclusion: Although the service has been running for over 15 years, Testlab is still meeting the needs of most users and could be a foundation for efforts like the Centre for Sexual Health of the Future.

Perfect Fit: Insights And Lessons Learned From The Interdisciplinary Development Of A Virtual Coach For Smoking Cessation And Physical Activity

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Presenter: Milon van Vliet

Abstract

Background: Physical inactivity and smoking are major modifiable risk factors for chronic diseases and premature death. Such health behaviors are, however, difficult to change. Mobile health (mHealth) interventions with virtual coaches offer a promising, scalable, and cost-effective health promotion strategy. However, many interventions are not sufficiently evidence-based or lack personalization. In the interdisciplinary Perfect Fit project, researchers collaborated to develop an mHealth intervention with a virtual coach providing personalized, real-time feedback to simultaneously promote smoking cessation and physical activity. We present Perfect Fit's intervention content, design and development as well as lessons learned, aiming to guide other researchers who are working interdisciplinary on digital interventions.

Methods: Different approaches were used to develop the Perfect Fit virtual coach. These encompassed literature reviews, empirical studies, collaboration with end-users, content development sprints, interdisciplinary collaboration and iterative proof-of-concept implementation.

Findings: Perfect Fit is evidence- and theory-based, integrating previous literature, behavior change taxonomies, identity theories, and the Relapse Prevention Model. Innovative techniques (e.g., sensor technology), tailoring and personalization are employed. Through an iterative development process that involved collaboration with an interdisciplinary team and end-users, we aimed to create an intervention meeting the needs of diverse populations, including hard-to-reach populations. Lessons learned include strategies for effective interdisciplinary collaboration and technical development (e.g., 'Find a good balance between wishes of end-users and legal possibilities'). Additionally, lessons learned regarding the design and implementation of the virtual coach will be presented, including tailoring of interactions with the virtual coach (e.g., 'let users "get to know" the virtual coach', 'tailor timing and frequency of intervention components').

Conclusion: The Perfect Fit development process was interactive, iterative and sometimes challenging. We hope that our experiences and lessons learned will inspire and practically guide others in the field of digital interventions.

Medical 3D Printing For Personalized Care: A Regional Ecosystem

Liedewij Vogelzang (Saxion University of Applied Sciences, Research Group Technology, Health and Care, Enschede, The Netherlands - Netherlands), Karin Voortman-Overbeek (Saxion University of Applied Sciences, Research Group Industrial Design, Enschede, The Netherlands - Netherlands), Wouter Weijermars (Saxion University of Applied Sciences, Research Group Industrial Design, Enschede, The Netherlands - Netherlands), Richard Evering (Saxion University of Applied Sciences, Research Group Technology, Health and Care, Enschede, The Netherlands - Netherlands), Marjolein den Ouden (Saxion, Research Group Technology, Health and Care + Regional Community College of Twente, Research Group Care and Tech. - Netherlands), Merlijn Smits (Saxion University of Applied Sciences, Research Group Industrial Design, Enschede, The Netherlands - Netherlands), Arie Paul van den Beukel (Saxion University of Applied Sciences, Research Group Industrial Design, Enschede, The Netherlands - Netherlands)

Presenter: Liedewij Vogelzang

Abstract

Background: 3D-technologies such as 3D-printing and scanning have the ability to personalize care via tailor-made products for individual patients. However, widespread uptake of 3D-printing in care settings is still limited. In the eastern part of the Netherlands, a consortium of healthcare organizations, businesses, and research institutes work together to strengthen the ecosystem on medical 3D-printing. This study aimed to identify requirements for and build the foundation of a desired regional ecosystem.

Methods: In a qualitative study using semi-structured interviews (n=6) and consortium meetings (n=3) the current state of the ecosystem and perspectives of consortium partners were investigated. Interviews, based on the NASSS-framework, focused on: current status of 3D-printing; added value for patient, professional and organization; design process and infrastructure (e.g. software, regulations); implementation in the work process (e.g. training). Additionally, semi-structured interviews (n=3) with experts from other medical 3D-labs in the Netherlands gave insight into barriers and best practices. Finally, five case studies provided insights from practice, and their input was integrated in the results. The preliminary results were verified in consortium meetings.

Findings: Participants indicated that a regional ecosystem for 3D-printing should be designed to support the following goals: develop knowledge and expertise; facilitate and optimize collaboration; facilitate product development; streamline implementation of existing (certified) personalized medical devices. Common barriers are: the slow pace of adoption and implementation; limited expertise regarding regulations; limited expertise within each organization and overall costs of 3D-printing. Facilitators are: willingness to implement 3D-printing and share expertise, and available materials/software.

Conclusion: Knowledge and expertise is scattered in the current ecosystem, and widespread uptake requires various expertise (e.g. design, medical and MDR). Organizations face similar challenges and can benefit from facing them collectively. The next step for the regional

ecosystem is to streamline collaboration, have shared visions and goals, interorganizational meetings and agreements on confidentiality.

Enhancing Nursing Education Through Collaborative Vr-Scenario Development: Co-Design And Preliminary Findings

Sarah Walburg (NHL Stenden University of Applied Sciences - Netherlands), Gijs Terlouw (NHL Stenden University of Applied Sciences - Netherlands)

Presenter: Sarah Walburg

Abstract

Background: Developments such as ageing populations and a shrinking pool of young professionals are putting pressure on the job market for nursing professionals. Additionally, there is a high turnover rate among nurses. These trends are not only causing problems in healthcare organisations but are also impacting nursing education. Staff shortages directly lead to a scarcity of mentors and internship sites for student nurses. Simulations offer a promising avenue within nursing education by providing targeted and relevant learning experiences to practice specific situations. The VR tool Ubisim, focusing on clinical reasoning and decision-making in clinical settings, presents concrete opportunities to develop scenarios that enhance the learning process for (future) nurses.

Method: Following a design-based research approach, different stakeholders developed a scenario for Ubisim addressing a rare complication in oncological abdominal surgery patients. By applying a common clinical reasoning methodology, (future) nurses navigate the scenario. Experiences gained from the VR tool are translated into practical insights during debriefing sessions. The scenario was developed in partnership with a local hospital and tested by practising nurses (n=14).

Results: Nurses report added value in several areas, including teamwork, handling stressful situations, and practising without real-life consequences. In addition to professional benefits, participants express high enthusiasm. The co-design approach contributed to creating relevant scenarios for practice and meaningful learning experiences. Collaborative scenario development enhances learning by exploring practical situations, which can be integrated into education.

Conclusion: Collaborative scenario development with practitioners leads to relevant learning experiences. Scenarios and debriefing sessions contribute to developing targeted skills such as clinical reasoning and decision-making. By engaging with practice settings, nursing education can better prepare students for real-world challenges and foster continuous professional development.

Key Stakeholders' Values And Motives Regarding The Centre For Sexual Health Of The Future

Noa Wamelink (Aidsfonds - Soa Aids Nederland - Netherlands), Yvette Janse (Aidsfonds - Soa Aids Nederland - Netherlands), Siem Visser (Aidsfonds - Soa Aids Nederland - Netherlands), Ann Deenik (Aidsfonds - Soa Aids Nederland - Netherlands)

Presenter: Noa Wamelink

Abstract

Background: Key stakeholders for care and prevention of sexually transmitted diseases in the Netherlands are next to national governments, public healthcare departments of local governments, general practitioners, diagnostic laboratories and health insurers. Their underlying motives and values are not well documented however. In order to improve access to STD testing and care a better understanding of the motives and values of these stakeholders regarding future developments in STD testing and care through digital means is required.

Methods: Qualitative research with in-depth semi-structured interviews and observations as well as literature research of case studies were used to explore the motives and values of healthcare departments of various local governments, health insurance companies, general practitioners and diagnostic laboratories involved in STD testing.

Results: Stakeholders differed in terms of their involvement with STD testing; prioirties and business strategies varied. Shared values included professional identity, a positive stance towards ehealth and innovation and professional autonomy. Although each stakeholder stressed the importance of quality standards of care, the definition of good quality appeared to be influenced by their varying professionals values and competing or conflicting interests.

Conclusion: It is crucial to take into account the various motives and values of stakeholders in sexual healthcare and STD testing and control before implementing innovative hybrid solutions that aim to improve STD testing and care throug digital means.

Data-Driven Long Term Healthcare: Current Practice And Caregiver Needs

Jobke Wentzel (Department of Health Care and Social Studies, University of Applied Sciences Windesheim, Zwolle - Netherlands), Fenne Verhoeven (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences, Zwolle - Netherlands), Marike Hettinga (Research group IT Innovations in Healthcare, Windesheim University of Applied Sciences, Zwolle - Netherlands), Ronald Uittenbroek (Health and wellbeing research centre, Windesheim University of Applied Sciences, Zwolle - Netherlands)

Presenter: Jobke Wentzel

Abstract

Background: Data-driven healthcare seems promising for enhancing care quality and personalization. However, actual data use among caregivers outside clinical settings is not yet common practice. This study examines how data-driven healthcare in long-term care settings can be enabled and explores how caregivers can use data in daily care practice.

Methods: Focus groups at four long-term care organizations in and around Zwolle (Nov-Dec, 2023) were conducted with caregivers and other staff like innovation managers (n=26). To probe opinions, we designed a conversation tool aimed at matching healthcare problems with data technology. Plenary discussions examined implementation requirements. NASSS-framework was used for thematic analysis.

Findings: Three care situations where data can be applied were mostly recognized: incontinence, (preventing) falls, and problematic behaviour. Furthermore, examples of available data types were: electronic patient files, sensor data like fall detection or bed sensors, and smart incontinence data. Actual application varied, and no data was yet used structurally for care decisions. Data was used reactively rather than predictively. Issues with data registration and systems interoperability were mentioned as main implementation barriers. Participants acknowledged potential value of data-driven care, both for patients and caregivers/organization: Improved quality of care, self-management, decision-making and efficiency, personalized care, and provision of valuable insights, surfaced in various examples. Participants further mentioned roles can become more pronounced and might change due to more structural data use: more insight into what formal and informal caregivers do, and what patients (can) do themselves.

Conclusion: Results aligned with NASSS-framework themes, demonstrating its utility in practice-oriented research for describing current practices and implementation factors. Our CanMeds-based discussion tool (‘Mix&Match’-based) facilitated caregivers' connection of theoretical description of data-driven care to daily work practice. Staff and expert input in the conversation enabled bottom-up and top-down reflection. Such multi-perspective discussions are indispensable in fostering data-driven care in long-term settings.

International Case Studies On Improving Access To STD Testing And Care Through Digital Services

Marlijn van den Wijngaard (Aidsfonds - Soa Aids Nederland - Netherlands)

Presenter: Marlijn van den Wijngaard

Abstract

Background: In the Netherlands the prevention and control of sexually transmitted diseases (STDs) is fragmented and under pressure. Condom use has significantly decreased over the years and the burden of STD consultations and screening on the healthcare system is increasing. More people have started using private services for STD testing, which do not always work according to professional guidelines and are insufficiently linked to public STD surveillance and monitoring. In order to assess and compare the situation in the Netherlands and ultimately improve the system for STD prevention and control, international case studies of digital health system which aim to improve access to STD testing and care were assessed and barriers and facilitators of implementation of these systems were identified.

Methods: An comparative study was conducted on improving access to STD testing and care through digital services using multilingual literature research and in-depth interviews with key international stakeholders in the global north following an extensive stakeholder mapping.

Findings: Despite and extensive literature search, only a few cases of innovative health system approaches were documented sufficiently to enable a systematic comparison between these countries and the situation in the Netherlands. Exemplary cases came from the United States and the United Kingdom. Despite contextual differences in healthcare funding and organization, key success facilitators and barriers emerged including multi-disciplinairy collaboration, user centered design, system thinking, and value-based healthcare. To make sure STD care remains accessible to most, a hybrid model of online platforms supporting offline care provision was seen as necessary.

Conclusion: In order to understand the impact of digital services for improving access to STD prevention and care it is imperative for governments and healthcare providers to better document and publish their case studies and share best practices.

Business Modelling For Smart Sensor Technology To Support Aging In Place Of People With Dementia

Christian Wrede (Centre for eHealth & Wellbeing Research, University of Twente, Enschede - Netherlands), Annemarie Braakman-Jansen (Centre for eHealth & Wellbeing Research, University of Twente, Enschede - Netherlands), Lisette van Gemert-Pijnen (Centre for eHealth & Wellbeing Research, University of Twente, Enschede - Netherlands)

Presenter: Christian Wrede

Abstract

Background: There is growing interest to support extended independent living of people with dementia (PwD) via smart sensor technologies which allow caregivers to remotely monitor health and safety of PwD. However, sustainable implementation requires a better understanding of viable business models that can bring this technology to the market. The aim of this study was therefore to (1) develop a stakeholder-driven business model for smart sensor technology in home-based dementia care, and (2) outline the development process as an illustrative example.

Methods: We used a survey (snowball sampling) to identify key stakeholders for smart sensor technology in home-based dementia care. Those stakeholders were consulted step-by-step during interviews and focus groups to create various elements of a business model using the Business Model Canvas. First, we consulted end-users (PwD, informal caregivers, district nurses; N=14) and care provider representatives (policymakers aged care; N=10) to identify the value proposition of smart sensor technology in home-based dementia care. Subsequently, we consulted potential payers (health insurers, municipalities; N=6), technology suppliers (N=6), and care provider representatives (N=6) to create the remaining parts of the business model.

Results: Our preliminary results revealed two distinct business models for smart sensor technology in home-based dementia care: (1) A B2C model for a consumer device used by informal caregivers of PwD only via the private market, and (2) a B2B2C model for a medical device used by home care organizations delivering care to PwD. Both models specify what is needed for successful implementation regarding the ‘’supply side” (partners, activities, resources and costs) and the ‘’demand side” (customer segments, relations, channels, and reimbursement).

Conclusions: Our findings can inform the stakeholder-driven implementation of sensor technology to support home-based dementia care. Also, our approach might serve as inspiration for innovators aiming to develop sustainable business models for dementia care technology.

Stepped Care: Theoretical Framework For Blending Online And Offline Information And Care

Filippo Zimbile (RIVM - Netherlands)

Presenter: Filippo Zimbile

Abstract

Background: Public Sexual and Reproductive Health (SRH) services are traditionally provided face-to-face by Dutch Sexual Healthcare Clinics. High demand for these services led to the exploration of digital health to increase access and support self-care. However, the implementation was fragmented and uncoordinated. The Stepped Care Model (SCM) was introduced to (1) organize coordination and cooperation between regional and national providers of public SRH-services; (2) link digital services to clinical services; (3) increase the accessibility of SRH-services; and (4) promote self-care.

Methods: Scientific literature was reviewed to establish if stepped care can be used in the context of sexual healthcare. An international scientific and grey literature study was conducted.

Findings: There is evidence that the SCM can increase access to quality information and services for people and improve health service provider experiences, lowering the burden on the healthcare system, and empowering clients to become more self-reliant. Stepped care comprises of a hierarchy of services and complimentary steps to tailor information and service provision to individual's health needs.The SCM shows how efficiency in health systems can be achieved following the principle of economies of scale: more coordination and less fragmentation, leading to lower costs for development and implementation of digital services, availability and bundling of specialized technical and regulatory expertise and financial resources, ultimately leading to reduced waiting times and more self-care.

Conclusion: Stepped care may offer a promising framework for sexual healthcare based on existing evidence. More impact research is required to show effects on health systems.

Technology Implementation: Utilizing The Nasss Framework In Health And Care Organizations In A Qualitative Study

Niek Zuidhof (Saxion University of Applied Sciences - Netherlands), Marloes Bults (Saxion University of Applied Sciences - Netherlands), Gerda van den Berg (Saxion University of Applied Sciences - Netherlands), Theo Olthuis (Regional Community College of Twente - Netherlands), Daisy van der Linden (Saxion University of Applied Sciences - Netherlands), Jolien Stokkers-Scholten (Saxion University of Applied Sciences - Netherlands), Ellis oude Kempers (Saxion University of Applied Sciences - Netherlands), Marjolein den Ouden (Saxion University of Applied Sciences - Netherlands)

Presenter: Niek Zuidhof

Abstract

Despite the extensive efforts to implement technology, many health and care organizations face challenges in achieving optimal application of technology. To enhance technology implementation in organizations, a systematic approach is essential for gaining insights into addressing these challenges. The evaluation of the Nonadoption, Abandonment, challenges to Scale-up, Spread, and Sustainability of health and care technologies (NASSS) framework presents a promising avenue for exploration. However, its application and added value remains unexplored in the Netherlands, particularly within health and care organizations.

This study aimed to examine the utilization of the NASSS framework in three organizations and assess their readiness for technology implementation through the lens of the NASSS framework. This qualitative study consisted of both 3 focus groups and additional interviews. Participants (N=40) included were managers and professionals from three organizations specializing in elderly care, youth care, and services for individuals with disabilities. Each organization provided a unique case study of technology use, specifically in the context of remote care delivery. The topic list consisted of the NASSS-domains, i.e. condition, technology, value proposition, adopter system, care organization, wider system and adaptation over time. The application of the NASSS framework revealed its initial focus on patient care and illness management. Following revision, new discussion guides for the focus groups and interviews were created.

Preliminary findings using this guide suggested that, despite organizational differences, a common challenge in implementation primarily revolves around education. Specifically, the lack of knowledge and insufficient training programs tailored to professionals' needs were identified as significant barriers, indicating that implementation strategies should prioritize addressing these areas.

The NASSS framework is adaptable and adds value in the context of more complex implementation issues. Moreover, it has the potential to identify both opportunities and obstacles for organizations, thereby laying a robust foundation for the development of effective technology implementation strategies.