

ABSTRACTS

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2023 TTRN International Scientific Conference

An International Perspective on Building Capacity in Health Care through Technology

August 22-23, 2023










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Keynote Speaker Abstracts

Digital health technologies can ease the staffing shortage and empower patients

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Background: WHO estimates a lack of 10 million health workers by 2030, mostly in low- and lower-middle income countries. Countries at all levels of socioeconomic development face, to varying degrees, difficulties in the education, employment, deployment, retention, and performance of their workforce in the healthcare sector.

Objective: To address the potential in implementing digital health care solutions to ease the staffing shortage and empower patients.

Methods: Review of the literature on how digital solutions can ease the staffing shortage, increase clinical effectiveness, and empower patients.

Results: There are several digital solutions within clinical practice that can ease workflows for healthcare professionals and help them save time, work smarter and empower patients so that admissions can be prevented. Technologies within artificial intelligence (AI) is forecasted to help with decision support in clinical practice, but more robust studies must be conducted.

Conclusions: Digital health technologies can ease the staffing shortage and empower patients to avoid admissions to hospitals. AI technologies is predicted to help in clinical decision support, but more research is needed.

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Hybrid Care – the new normal for psychiatry leads to improved provider wellbeing and global workforce capacity

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Background: After many years of relatively small use, telepsychiatry, as a result of the Covid-19 pandemic, has suddenly become commonplace in American healthcare, with over 70% of psychiatrists reporting treating patients online in 2023. Hybrid treatment of patients, both online at home and in-person at the clinic, depending on convenience and accessibility, has become common, through the use of both synchronous and asynchronous text, telephony and video techniques.

Objectives:

1. Understand telepsychiatry technologies and hybrid care models used in mental health.
2. Be aware of evidence supporting Hybrid and Asynchronous care from the Covid-19 era, and the move of patient care to the home in the setting of the adverse impact of climate change on mental health
3. Understand that the use of technologies with patients is good for clinician wellbeing and global workforce capacity.

Methods: While the Covid-19 pandemic led to a dramatic increase in hybrid care, and care in the home, the slower moving but more important series of disasters related to climate change are now starting to impact mental health delivery. While climate change will have adverse impacts on many patients and mental health providers, the increasing use of technology in mental health service provision is likely to be a mitigating factor that will lead to improved provider well-being.

Results: A review of the evidence supporting the positive linkage of the use of health technologies in the setting of Covid-19 and climate change, and improved provider well-being will be presented.

Conclusions: A growing range of technologies and models of care are in use with patients with psychiatric disorders. Hybrid care and virtual home visits are becoming the “new normal” and are good for provider wellbeing and increasing provider workforce capacity.

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What are the health care providers role? Barriers or facilitators for implementation of digital health technologies?

Martin S. Vesterby MD, PhD

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Background: The rapid advancements in digital health technologies have the potential to revolutionize healthcare delivery, improve patient outcomes, and enhance the overall efficiency of healthcare systems. However, the successful implementation

of these technologies faces various barriers and relies heavily on the active involvement of healthcare professionals, particularly doctors.

Objective: This keynote will share learnings from Denmark inspired by the experience of resistance to the implementation of digital health technologies and change. Both on an organizational level and on an individual level among doctors.

Methods: The learnings presented in this talk are based on a combination of interviews with healthcare providers, hospital management, and a test of doctors' tendency for overconfidence.

Results: We found that healthcare providers often have a “fear” of the consequences of the integration of digital health technologies into clinical workflows. They include – Removal of close contact with patients - Missing the patient’s needs – To be left with more challenging work.

At a management level, we found that there was a call for more robust training and education programs for doctors and the availability of adequate technical support and infrastructure. Finally we found that Doctors have a strong tendency to overconfidence and we theorize that this could be a barrier to innovation and digital transition.

Doctors play a role in the successful implementation of digital health technologies. Doctors are essential stakeholders who bridge the gap between technology and patient care, and their engagement and acceptance are critical for widespread adoption.

Conclusions: Doctors must cultivate digital health literacy, foster a positive attitude toward technology, and actively participate in designing and evaluating digital health solutions. It is important to challenge doctors' tendency to overconfidence and the culture that comes with it.

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Are we just converting existing health care to technology rather than exploring the innovative potential of technology in health care?

Helle Spindler, MSc, PhD

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Background: Digital health care has gained increased recognition following Covid-19, however, the rapid implementation of digital health care related to Covid-19 may result in inferior use of the innovative potential of digitalization if existing health care is simply converted to a digital format rather than using the opportunity to consider whether a digital approach offers new ways and new possibilities for optimizing the design of health care. A more innovative approach when implementing digital health care may be able to overcome the shortage of staff and resources in today’s health care services.

Objective: To present innovative approaches to digital health care and discuss how we can make the most of user-driven innovation and participatory design to ascertain how technology may pave the ground for new ways of providing patient-centred care that is able to overcome the challenges in today’s health care system.

Methods: A focused literature review

Results: There is a need to promote individualized or personalized medicine in telehealth, while also ensuring that available resources are used most effectively, e.g. increasing patient self-care and self-management, thus freeing up resources for more care-demanding patients. This may be achieved by focusing on increasing motivation for engaging in rehabilitation, providing patient-centred education with self-care supporting technology, as well as providing easier access to specialized care professionals through online consultations. User-driven innovation and participatory design are salient to design patient-centred and effective digital solutions for future health care.

Conclusion: Future health care must make the most of available resources. Using user-driven innovation and participatory design to identify how technology may pave the ground for new ways of providing patient-centred care by focusing on the ability of technology to overcome some of the existing challenges, such as shortage of staff and resources, facing the health care system of today.

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The effects of telemedicine on clinician time – a blind spot in research

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Background: In response to the COVID-19 outbreak there has been an increase in the use of telemedicine. It has been argued that telemedicine can reduce clinician time spent on delivering care. This effect is valuable as many countries currently experience shortage of healthcare staff. In connection with this, we recently proposed that policymakers should estimate the

Time Needed to Treat [TNT] to clarify the effect of translating recommended care into practice on clinicians' time and on the resulting opportunity costs for other patients and problems.

Objective: We sought to describe the degree to which telemedicine trials assess the effect of telemedicine on clinicians' time.

Methods: We conducted a scoping review by searching clinicaltrials.gov using the search term "telemedicine" and limiting results to randomized trials of telemedicine registered between January 1 2012 and December 1 2022 and tagged as completed or terminated studies with results. We then reviewed trial registration data to determine if any of the outcomes assessed in trials measured the effect of telemedicine on clinicians' time, and based the analysis on the Time Needed to Treat (TNT) concept.

Results: We found 71 studies, including 55 randomized trials, of telemedicine interventions. Six (9%) of the 55 trials had some measure of clinician time as a primary outcome (e.g. readmissions), and 11 [17%] as secondary outcome (e.g. nursing home visits). Three trials compared TNT with telemedicine vs. usual care, two were no different, and one, on the time spent managing the care of patients with diabetes on insulin, favored telemedicine.

Conclusion: This scoping review found that clinician time is not commonly measured in randomized trials of telemedicine interventions. Attention to telemedicine's TNT in evaluations of telemedicine in practice may bring attention to the organization of workflows and increase the value of telemedicine.

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Centering equity in digital health implementation

Courtney R. Lyles, PhD¹

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Background: The COVID pandemic shone a light on multi-level disparities in digital access and implementation, with examples from lack of broadband availability to barriers to receipt of core programs such as telemedicine.

Objective and Approach: The objective of this talk is to review a framework for digital health equity, highlighting core pillars of action that can advance health and healthcare implementation activities. Using existing theories and frameworks (such as the Institute for Healthcare Improvement's Framework for Organizations to Improve Health Equity), we can create a comprehensive vision for centering equity within all digital and technology programs within our organizations.

Conclusions: Digital health equity is imperative and central to the future of healthcare organizations. We must take concrete and collective action to implement equity-first technology platforms and programs within our work.

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Current state of technology and the need for training and educational initiatives in telehealth

Frederic Lievens, MSc

International Society for Telemedicine & eHealth, Belgium

Telehealth has seen an enormous evolution over the past few decades. A lot of hypes have come up, some of which did not last, but many of which have actually turned into mainstream usage or applications. Artificial Intelligence (AI) is one of those current hypes, but obviously much more than a hype, it is an important development and one that will influence healthcare provision profoundly.

Throughout all these changes and developments, education and training have been and are important to provide healthcare professionals with updated knowledge and also with practical insights (around 'websites' manner, as opposed to bedside manner, to name but one) to stay on top of the new developments and to be able to integrate the newest tools and technologies in their daily practice.

The International Society for Telemedicine & eHealth (ISfTeH), a global network of telehealth/digital health stakeholders and experts, is currently embarking on some initiatives related to adapted training and educational programs, based on requests and requirements from telehealth service provider organizations in the field.

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Leveraging Telehealth Interventions to Better Serve Children's Hospitals and Communities

Promoting digital health equity in pediatric care

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Background: Digital health technologies have the potential to improve access to care for under-served and under-resourced populations. However, they also have the potential to exacerbate existing disparities.

Objectives: (1) Recognize the ways in which digital health has, and has not, promoted health equity; (2) Understand the importance of designing, deploying, and monitoring digital health as it relates to health equity.

Methods: This session will explore digital health equity, with a focus on pediatric care. It will include the promises of digital innovations in mitigating inequities as well as the challenges facing the use of technology in healthcare delivery systems, specifically as it relates to digital inequities. The session will include a discussion of best practices and potential solutions to addressing the recognized challenges to promote the goal that people have equal opportunity to use and benefit from digital tools to achieve their highest health outcomes. It will conclude with areas for future research and strategies to addressing the ethical and social implications of conducting research that includes under-served and under-researched communities. Each topic will include the integration of evidence and real-world use examples.

Conclusions: It is imperative to design, implement, and evaluate digital innovations to promote digital health equity and leverage these technologies to address disparities.

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Differential impact of virtual family-centered rounds in the neonatal intensive care unit by race/ethnicity and insurance

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Background: Family-centered rounds (FCR) are best practice care for hospitalized children. However, families must be present at the bedside during FCR, which is an accessibility barrier for socially disadvantaged children and families. Using telehealth to conduct virtual FCR could potentially promote equitable caregiver FCR access.

Objective: Assess the impacts of a virtual FCR intervention in the neonatal intensive care unit by infant race/ethnicity and insurance.

Methods: We conducted a 2:1 randomized controlled trial (NCT04265677). Caregivers of intervention arm infants were invited to participate in virtual FCR plus usual care, while control arm infants received usual care. Participants were analyzed according to assigned group (intervention versus control) and by race/ethnicity (non-Hispanic White versus other) and insurance (private versus public). To account for varying lengths-of-stay, we used Poisson regression to estimate and compare FCR caregiver attendance rates, using the logarithm of the number of weekdays as an offset. Heterogeneity of intervention effects was assessed using interaction terms.

Results: We included all enrolled trial subjects (74 intervention, 36 control). Intervention arm infants had 3.36 (95% CI: 2.66–4.23) times the FCR caregiver attendance rate of subjects in the control arm. The intervention effect was 2.15 times (95% CI: 1.30–3.56) more beneficial for racial/ethnic minorities than for non-Hispanic White subjects, mitigating the inequity in minority FCR attendance relative rates, changing it from 0.32 (95% CI: 0.20–0.50) in the control arm to 0.68 (95% CI: 0.56–0.83). In contrast, the benefit of the intervention for patients with public insurance (3.21, 95% CI: 2.24–4.59) was one-third (0.32, 95% CI: 0.17–0.63) that for privately-insured patients (9.87, 95% CI: 5.67–17.18).

Conclusions: Virtual FCR in the neonatal intensive care unit improved caregiver FCR attendance overall, with greater benefits for racial and ethnic minority groups. Further research is needed to mitigate the differential benefit demonstrated for privately insured subjects.

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Comparing models of virtual care to improve pediatric psychiatry services for children with special healthcare needs

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Background: California's medical therapy program provides pediatric psychiatry services for children with physical disabilities in school-based clinics. Twenty-one counties in California have only one clinic and sixteen counties have no clinic, creating barriers to access.

Objective: To compare three models of pediatric psychiatry care in terms of patient, provider, and therapist experience with the goal of identifying a model that optimizes quality and access.

Methods: We implemented two models in conjunction with the current in-person model. In the hybrid model, the psychiatrist conducts the visit virtually while the therapist and patient are in person together; in the second model all participants join virtually. We used an explanatory sequential mixed methods design to evaluate the three models. We collected survey data from parents, psychiatrists, and therapists after each visit to assess parent experience (CAHPS scores), and self-reports of visit quality for therapists and psychiatrists. To better understand these quantitative data, we conducted six focus groups with parents, therapists, and psychiatrists.

Results: A total of 694 visits were completed at 11 clinics during the study period (January 2019 through February 2022). Parent surveys showed no difference in experience between the three models; however, therapists and physicians perceived the all-virtual visits to be lower quality. Parents, therapists, and psychiatrists identified specific circumstances in which the all-virtual model worked well, including for children with stable conditions, when travel is impossible, or when the purpose of the visit involved an activity especially suited to being in the child's home (e.g., dressing).

Conclusions: The hybrid model is equivalent to in-person care in terms of quality and experience. This model has the potential to improve access to care for rural children while maintaining a high level of quality. All-virtual visits should be used to complement this model of care in some situations.

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Assessment of the Value of AI Technologies in Health Care, Session 1

Model for assessing the value of AI in medical imaging (MAS-AI) + the VR8 case

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Background and objective: Artificial intelligence (AI) is seen as a major disrupting force in the future healthcare system. However, the assessment of the value of AI technologies is still unclear. Therefore, a multidisciplinary group of experts and patients developed a Model for ASsessing the value of AI (MAS-AI) in medical imaging. The Medical imaging is chosen due to the maturity of AI in this area, ensuring a robust evidence-based model.

Methods: MAS-AI was developed in three phases. First, a literature review of existing guides, evaluations, and assessments of the value of AI in the field of medical imaging. Next, we interviewed leading researchers in AI in Denmark. The third phase consisted of two workshops where decision makers, patient organizations, and researchers discussed crucial topics for evaluating AI. The multidisciplinary team revised the model between workshops according to comments.

Results: The MAS-AI guideline is covering nine domains and five process factors supporting the assessment. Step 1 contains a description of patients, how the AI model was developed, and initial ethical and legal considerations. In step 2, a multidisciplinary assessment of outcomes of the AI application is done for the five remaining domains: safety, clinical aspects, economics, organizational aspects, and patient aspects. AI case used: VR8 for treating patients with social anxiety.

Conclusions: We have developed a health technology assessment-based framework to support the introduction of AI technologies into healthcare in medical imaging. It is essential to ensure informed and valid decisions regarding the adoption of AI with a structured process and tool. MAS-AI can help support decision making and provide greater transparency for all parties.

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Artificial registered nurse intelligence (aRNi): A comparison of value and use during (Time 1) and after COVID-19 (Time 2)

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Problem: Artificial intelligence (AI) devices should reduce nursing workload and/or time to retrieve data, but only if used.

Significance: A new device is not guaranteed to be valuable simply because it is available. We compared value and frequency of interactions of an artificial registered nurse intelligence (aRNi) voice-activated, interactive product at 2 time points.

Methods: A prospective, 2-cohort (by time) design was used. aRNi's were placed on 12 medical-surgical units in 4 hospitals (Time 1) and 15 units in 5 hospitals (Time 2). Nurses completed validated questionnaires on value at 6-weeks and 6-months (Time 1) and 3 months (Time 2). Data from aRNi were retrieved from the cloud at 6 weeks and 6 months at both periods to evaluate nurse interactions. Value scores were standardized (0-100 scale). Regression models were created to compare the adjusted effects of value by time periods and sites and frequency of aRNi interactions.

Results: Of 183 participants (Time 1) and 66 (Time 2), nurse characteristics were similar. Mean (SD) overall aRNi value score at Time 1 was 57.0 (5.4) and at Time 2, 37.0 (26.2), slope (95% CI): -24.43 (-30.38, -18.48), $p < 0.001$. Frequency of interactions with aRNi declined when assessed at 6 weeks and 6 months (655 to 145 [Time 1] and 603 to 154 [Time 2]), despite that there were 3 additional sites in Time 2 assessment, combined data risk ratio (95% CI), 0.28 (0.14, 0.57), $p < 0.001$. Value scores were associated with the number of interactions and interactions were more often focused on medications: (71.25% [Time 1] and 64.63% [Time 2]), with medical themes increasing over time, from 19.25% to 25.23%, $p = 0.027$.

Conclusion: Perceptions of the value of aRNi and interactions with aRNi devices decreased over time. Interactions focused mainly on medication questions. Device features might need refinement to enhance use and value.

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Assessing ethical organizational maturity in AI adoption in translational science

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The range of individual feelings of anticipation and anxiety regarding implementing generative AI technologies in translational health science is broad, rapidly evolving and reactive to the extremely rapid pace of development within academia, health practice, and industry. While disruption coupled with potential for innovation are broadly expected, the need for multidisciplinary clinical, engineering and legal expertise to rigorously assess and evaluate potential impacts of AI technologies in research, training and health operations has elicited a myriad of strongly felt perspectives on what guiding ethical frameworks should be available to support this work in academic biomedical institutions. Operational and legal considerations such as

safety, privacy and reliability are intermixed with ethical perspectives of benevolence, trustworthiness and justice – and further modified by data science and academic approaches such as transparency, reproducibility and management of data bias. We are developing the Research Data Ethics Maturity Model (README) to understand how institutional communities view, understand and support AI implementation in translational health science. We will summarize the range of complementary maturity models, legal frameworks and technology methods associated with the adoption of these tools, discuss the alignment and mapping of these principles to community workshops, and review the maturity of data resources, training and institutional stakeholders involved in system evaluation and adoption.

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Perception of Telehealth Among Patients and Health Care Professionals

Increasing equality in health care through technology-enhanced motivation in telerehabilitation

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Background: Rehabilitation programs are an integrated part of secondary prevention in health care. However, a significant number of patients are not motivated to participate, hence they do not initiate, engage in, or continue their rehabilitation program. Telerehabilitation may overcome barriers to participation in rehabilitation such as distance, timing of rehabilitation, and even shortage of staff, thus increasing equality in health care. However, it is unclear whether technology may enhance overall motivation to engage in rehabilitation thereby optimizing the outcome of rehabilitation for all patients.

Objective: To evaluate the impact of a technology-based motivation component in telerehabilitation based on a specific psychological theory of motivation, ie. self-determination theory (SDT).

Methods: A focused review of the literature focusing on technology-based motivational components of rehabilitation focusing on the self-determination theory framework for conceptualizing motivation.

Results: There is a limited number of studies focusing on technology-enhanced motivation, and even fewer are theory-driven. Therefore, the focus of the review was split in two: a) the ability of SDT-based interventions to increase motivation, and b) technology-enhanced motivational elements based on SDT. When combined, these two foci suggest that designing technology to enhance motivation may be relevant to various patient groups. In addition, a user-driven process combined with a theoretical understanding of motivation may be optimal as the basis of the design process. In addition, studies of SDT intervention indicate that using this theory for designing motivational interventions in various formats is successful.

Conclusion: Studies indicate that a user-driven, theory-based approach to designing motivational interventions for telerehabilitation and continuing self-care may be beneficial across patient groups. Due to the general applicability of the SDT as a theory of human motivation, this may be a superior choice for increasing motivation across patient groups, thus aiding in increasing equality in care, as more patients become engaged in rehabilitation.

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Qualitative study of provider perceptions of the transition to telehealth for home visitation program to support fragile infants

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Background: The onset of COVID-19 initiated a change in the delivery of care to adhere to social distancing guidelines, resulting in a rapid transition into telehealth services. The theoretical framework used in this study was the Technology Acceptance Model (TAM) which included three domains: Perceived Usefulness, Perceived Ease of Use, and Intention to Use.

Objective: This study aims to compare the experiences of home visitation staff transitioning services between in-home and telehealth due to the COVID-19 pandemic for case management of babies that have graduated from the NICU.

Methods: Semi-structured interviews were conducted with 6 eligible participants as one of two groups: transitioned from in-person visits to telehealth visits (n=3) or from telehealth to in-person visits (n=3). Rapid qualitative analysis method will be utilized to generate a thematic analysis. Coding will be completed deductively via a multi-step process.

Results: There were no major differences in the themes that the two groups of staff highlighted during their interviews. Themes were divided into four major focus categories: staff-centric, family-centric, technological challenges, and the experience of collective adjustment to the stressors of the pandemic. Staff-centric themes focused on staff's perception of their own effectiveness to perform their job, while family-centric themes looked at staff's perception of families' experience transitioning to a telehealth model of home visitation service delivery. Technology themes focused on hurdles for providing services in a digital forum and concerns of confidentiality and access. Lastly, collective adjustment focused on the growing pains experienced by staff and families alike and the importance of shared vulnerability to create stronger staff-client relationships.

Conclusions: From a staff perspective, there did not seem to be a difference in their effectiveness, providing services, or building rapport with families between in-person and telehealth service delivery models, indicating that telehealth is an effective mode of delivery for home visitation programs.

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Patients' Preferences for telehealth outpatient consultations and healthcare professionals' opinions of suitability for their patients: a single centre survey

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Background: Despite potential benefits and widespread implementation activity, the number of patients who actually prefer telehealth consultations rather than in-person consultations remains unknown. In the internal medicine outpatient clinic of Hospital of Southern Denmark 81.3% of consultations in 2022 were conducted in-person, 18.5% by telephone, and 0.2% by video.

Objective: We aimed to investigate: 1) Patient preferences for type of outpatient consultations; in-person, telephone, or video in the outpatient clinic for internal medicine, and 2) Healthcare professionals' (HCPs') opinions on whether or not outpatient consultations using video or telephone could be conducted with the same professional and clinical quality as in-person consultations.

Methods: A survey including patients with an in-person consultation and HCPs at the outpatient clinic covering three specialities; endocrinology, nephrology and pulmonology, at University Hospital of Southern Denmark, Department of Internal Medicine, Sønderborg from March 14 to April 12, 2023.

Results: In total, 221 patients (response rate 68%) completed the survey. When asked whether they would have preferred a telehealth consultation, provided it could have been conducted comparably via telehealth as in-person, 36% patients responded yes to either telephone or video. Furthermore, 24% would have preferred a video consultation and 33% a telephone consultation.

HCPs (73% nurses, 25% doctors, and 2% dieticians) completed suitability questionnaires on 271 patients corresponding to 83% of patients seen in the study period. HCPs estimated that 21% of the consultations could have been conducted comparably via telehealth as in-person, with 18% suitable for video and 17% suitable for telephone.

Conclusions: Around one-third of patients with in-person consultations would have preferred telehealth consultations provided they are comparable to in-person consultations. HCPs' estimated that around one of five consultations could have been conducted just as well via telehealth. These results suggest a substantial, unutilized potential for converting more in-person consultations to telehealth, especially video consultations.

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Telepalliation – A way of increasing a feeling of coherence in the care of patients with terminal illness across sectors

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Background: An estimated 20 million people are in need of palliative care worldwide, each year. The majority of these are suffering from cancer, followed by cardiovascular disease and chronic obstructive pulmonary disease. A web-based Telepalliation program and digital platform was developed (offering video calls, treatment planning, patient related outcome reporting, chat function and information on palliative subjects), through a participatory design process involving patients and their relatives, health care professionals and researchers.

Objective: The aim of the study is to explore the experiences of patients in palliative care participating in the TelePal Program

Methods: The overall method of the study is the case study method. The theoretical framework is Antonovsky “sense of coherence” theory. In this sub-study semi-structured qualitative interviews were carried out with 6 men (ages 55-82) and 4 women (46-76). All ten patients were diagnosed with cancer. The interviews were recorded and analyzed inspired by Brinkman and Kvale using Nivivo 12.0.

Results: Patients participating in the Telepalliation program articulated their experiences in terms of the following themes: The TelePal platform a) facilitates better communication with patients and healthcare professionals across sectors b) makes illness and symptoms easier to understand c) creates a sense of security d) gives a sense of coherence in caring across sectors e) increased freedom. Only few patients found it overwhelming to participate in the study.

Conclusions: Preliminary findings indicate that patients participating in a Telepalliation program experience a sense coherence in their care process and integrated care across sectors for the individual patients. They also feel a sense of security and freedom. Further research is needed on exploring benefits and drawbacks of the Telepalliation platform and program.

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Building Technology Capacity in Aging and Brain Health: An End-to-End Approach

Enhancing end-user engagement, receptivity, and capacity for technology adoption: Integrated programs and processes in aging and brain health

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Technology is critical to advance health care and health equity globally, and the opportunities for technology to enhance quality of life are particularly key for older persons. With dementia diagnoses expected to nearly triple in the next 25 years, healthcare technologies aimed at the prevention, early detection, diagnosis, treatment, and care of older persons at risk for or living with dementia are increasingly important. Unfortunately, healthcare technologies often are developed without ensuring they meet the needs of their intended end-users, limiting adoption, adherence, and impact. Little attention is also paid to the need for a strong receptor community for technology.

We discuss several integrated programs and processes developed by Baycrest Academy for Research and Education (BARE) and the Centre for Aging + Brain Health Innovation (CABHI), focused on aging, brain health, and dementia, but which can serve as a model for successful development and deployment of health technologies more broadly.

CABHI’s Leap platform puts end-users at the centre of innovation, connecting older persons, caregivers, and seniors care organizations with innovators, researchers, policy makers, and other innovation ecosystem partners. Spark provides front-line health care workers with opportunities to take on the innovation role themselves, with targeted funding, implementation support, and training, increasing their own receptivity to adoption technologies. D+A focuses on increasing the skills, capacity, and receptivity of seniors’ care organizations more broadly. KL-CARE provides systematic support for the assessment of health

technologies, taking a unique approach that engages multidisciplinary and interprofessional groups in large scale testing in real world settings, to maximize the likelihood of adoption after successful validation of technologies.

Together, these programs and processes increase the likelihood that health technologies will move from idea to impact, helping all older persons live their best lives, and serving as a model for successful technology implementation in other areas of health.

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Innovative edTech for workforce acceleration: LIPHA simulation game worlds to strengthen clinical specialization, professional socialization, teamwork and values-based practice

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Background: Scalable learning solutions are essential to offset healthcare workforce shortages. Grounded in educational theory, neuroscience and simulation best practices, the Learning Inter-Professionally Healthcare Accelerator (LIPHA) combines simulation-, case-, team- and story-based learning in the design of virtual simulation game worlds. As an innovative edTech solution, LIPHA can deliver virtual, asynchronous or hybrid clinical learning experiences in urban, rural, and remote areas. It is accessible to anyone with basic internet. As self-serve and self-authoring software, LIPHA is a shell that educators can adapt to teach any healthcare specialty.

Objective: LIPHA is designed to promote clinical specialization, professional socialization, inter-professionalism, and readiness to engage in values-based practice.

Methods: An outcome evaluation identified factors associated with game play outcomes. Quantitative data were analyzed using descriptive statistics, paired t-tests, Pearson correlation coefficients, and generalized linear models. Qualitative data were analyzed using thematic content analysis and thematic analysis.

Results: Preliminary findings revealed that learners (n = 877) were mostly or very satisfied, with nearly 75% already applying learnings from the platform. Learners reported increased interest in aging care and increased confidence in recognizing geriatric health conditions, assessing potential risks, working on an interdisciplinary team and engaging compassionately with residents. Statistically significant improvements were shown from pre to post-test.

Conclusions: To date, over 1,600 learners have benefited from LIPHA. Preliminary findings reinforce that simulation game worlds can enhance the learning experience by increasing motivation, engagement and meaning and by improving knowledge application with automated feedback. Scalable simulation game worlds can effectively augment training, orientation and education. By design, LIPHA enables learners in the health professions to find meaning in their role and strengthen their clinical specialization, professional socialization, teamwork and values based practice.

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Virtual behavioural medicine program: a scalable changer in care for neuropsychiatric symptoms in dementia

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Background: The Virtual Behavioural Medicine Program (VBM) at Baycrest is unique in the world and functions as a “virtual inpatient neurobehavioural unit” for management of patients with severe neuropsychiatric symptoms due to dementia such as physical aggression. Emergence of neuropsychiatric symptoms often leads to individuals suffering from dementia being uprooted from their familiar environment and sent to emergency departments and admitted to acute care hospitals or specialized transitional behavioural units. Moreover, the act of moving a patient with dementia to unfamiliar surroundings often worsens

neuropsychiatric symptoms simply due to a change in environment. VBM was developed to support management of patients with neuropsychiatric symptoms due to dementia while keeping them in their own familiar environment – either at home in the community or in long-term care.

Objective: We determined the efficacy of VBM in avoiding admissions of patients with neuropsychiatric symptoms in dementia to a specialized inpatient neurobehavioural unit.

Methods: We studied the first 95 consecutive patients referred to VBM. Patients were either referred to VBM with a simultaneous application to an inpatient Behavioural Neurology Unit (BNU) or were referred only to VBM. The primary outcome measure was reduction in proportion of patients requiring admission to the BNU regardless of whether they were referred to the BNU or to VBM alone.

Results: For the subset of patients referred to VBM plus the BNU, the proportion needing admission to the BNU was reduced by 60.42% %. For the subset referred to VBM alone, it was 68.75%.

Conclusions: VBM is a novel model of virtual care that facilitates management of patients with neuropsychiatric symptoms due to dementia while they remain in their familiar environment. This reduces preventable emergency department visits and acute care hospital admissions and thus reduces healthcare costs. VBM is a scalable model of virtual care that can be adopted worldwide.

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Evaluation and Effectiveness of Telehealth Interventions

Lessons learned evaluating a rapid cycle telehealth intervention among language-diverse, low-income older adults in the US

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Background: During national emergencies, interventions are rapidly deployed, and researchers must collect and analyze data quickly and efficiently to inform innovation in progress. Few researchers have evaluated rapid cycle telehealth interventions targeting language-diverse, low-income, older adults. During the COVID-19 pandemic, The Lighthouse Project provided residents in six affordable senior housing communities with free Wi-Fi and technology devices, and a peer- and community-based digital literacy training and support model was developed and tailored for each community.

Objective: To identify best practices for evaluating rapid cycle telehealth interventions with multiple levels of complexity (diverse settings, intervention components, participant demographics, and languages).

Methods: Pre, post, and follow-up surveys were designed to be collected at three timepoints: entry, 30- and 90- days. Surveys were adapted for low-literacy levels, translated in five languages, and pilot tested with staff and residents across two communities. Final surveys captured demographics, self-reported physical and emotional health, attitudes towards technology, frequency and preferred use of devices, and program satisfaction. Surveys were self-administered and collected and entered by staff at each community (N=1,050). Researchers analyzed survey data using descriptive statistical techniques. Qualitative interview data was collected from project staff and residents and analyzed through thematic analysis.

Results: Survey instrument selection for language-diverse participants was complex. Some evidence-based health measures did not perform well due to language and literacy barriers. Measures capturing comfort with technology, perceived usefulness, and self-reported device use provided insight into technology acceptance. Interviews provided opportunities to capture diverse perspectives, validate and interpret findings, and identify lessons learned on project implementation, sustainability, and generalizability.

Conclusions: For evaluating rapid telehealth implementations, researchers should consider mixed method approaches that allow for flexibility, reflection, and timely feedback and adjustment.

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Statewide implementation of a web-based interactive platform to enhance equitable support for caregivers: implementation outcomes

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Aim: To describe implementation outcomes two years after initial statewide implementation of a web-based interactive resource information technology/platform supporting standardized caregiver assessment and provision of tailored resources (CareNav™) in eleven California Caregivers Resource Centers (CRCs).

Background: California CRCs are a network of nonprofit agencies providing support and services for family caregivers. In 2019, the California Department of Health Care Services funded the 11 CRCs to expand and improve family caregiver services by deploying CareNav™ as a common platform accessed by clients and CRCs staff across the state. Technology implementation began in January 2020 and was complete by September 2020, enabling the first state-wide data base of caregivers and the challenges they face.

Methods: We used a mixed methods concurrent triangulation design to collect data from 114 anonymous electronic surveys and 24 focus groups and interviews with across CRCs leaders, staff and implementation team members. The survey included 15 items assessing Knowledge and beliefs, Self-efficacy regarding the implementation process and Readiness for change. The 45-60 minute interviews were performed via Zoom using a semi-structured interview guide focusing on CareNav™ implementation process, impacts on workflow and on serving clients. The data were collected in March to May 2022. The Consolidated Framework for Implementation Research guided the initial coding procedures then the Dynamic Sustainability Framework informed the interpretation/mapping of intervention site-level and system-level implementation outcomes.

Results: All participants highlighted standardized assessment, report generation and the client portal as useful CareNav™ features, while some used data to support client-provider and site-level functions and guide and evaluate selective outreach. We identified differences in implementation patterns in adoption of CareNav™ by CRC site. Developmental stage was shaped by baseline information systems at each site, the timing of CareNav™ launch, staffing, staff and leader attitudes toward implementation and centralization. In turn, participants identified several site-level structures, processes and outcomes impacted by the implementation process, including reorganization of staff and refining roles to accommodate the new workflow, team collaboration and business efficiencies. The dynamic process of developing a statewide common CRC identity involved a shift in service philosophy for some sites, balanced by the empowerment of developing a shared vision and processes and structures that foster greater inclusion across race/ethnicity and language groups.

Conclusion: The study identified individual and site-level factors related to the CareNav™ implementation process. The variability of developmental implementation patterns and the tendency to focus on individual client data before more advanced analytical processes provide evidence for a non-linear implementation course of a multi-component health information technology adoption across a diverse network, common for healthcare organizations. Future longitudinal studies should explore long-term adoption trajectories to inform continuous implementation planning.

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Economic evaluation of the use of patient reported outcome methods in the diagnosis of sleep disorders – a retrospective study

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This paper aims to assess the cost-effectiveness of a new approach for the diagnosing sleep disorders using Patient Reported Outcomes and virtual consultations, compared to the traditional diagnostic approach. The study is conducted in collaboration with Odense University Hospital.

The analysis comes because of the need for technological and innovative solutions to fight the lack of workers in the western world health system.

The methodology section outlines the study design, data collection process, and cost calculation. The study utilizes data only from one journaling system, ensuring data uniformity. A cost catalogue is developed for calculating the average cost per patient. The results section presents the findings, including a comparison of the two diagnostic approaches. The PROM approach demonstrates a reduction in the average number of contacts, procedures, and costs per patient. The average time to diagnosis is also significantly shortened. Patients save also on commuting costs.

Strengths of the study include the consistent referral method and use of uniform data, which enhance its reliability. The study also compares its findings with existing research, providing a comprehensive analysis. However, limitations such as

imbalanced sample sizes, potential data limitations, and limited data on the difference in quality of diagnoses of each approach should be considered when interpreting the results.

In conclusion, the study indicates promising cost-effectiveness and efficiency gains with the use of PROMs for diagnosing sleep disorders. The findings go in line and contribute to the tendency of addressing barriers to diagnosis and treatment and investing in innovative approaches. Further research and evaluation are needed to assess the quality of the diagnostic and see if this is a reliable alternative to reduce the overall cost to diagnose a patient with sleep disorders.

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Telesonouroflowmetry: a digital strategy in clinical practice

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Introduction: Uroflowmetry, is commonly used to assess lower urinary tract symptoms. Sound-based uroflowmetry applications make telemedicine and smartphone technologies potential drivers for self-empowerment, improved access, and homebased care. Between 15/06/2021 and 27/03/2022, we evaluated the use of a publicly available smartphone App in office urology. Ability to download the App, generate data and send to the urologist were studied.

Methods: Study was prospective, inclusion criteria: adults > 18 years; own smartphone; internet access; referred with a urological condition. Excluded were: no smart phone ownership, urinary retention, non-consenting. Consent English/French. A telemedicine assessment and unique ID # enabled participant download the App, on 4 consecutive days for urination activities and send data to the urologist. Virtual care encounter to review data and treatment options followed. Feedback was by online survey. Data collection and analysis was by Excel and descriptive statistics. Local Ethics Board granted approval. Government sponsored network provided Telemedicine service

Results: Of 105 participants, 84 (80%) were men and 21 (20%) were women aged 22 and 75, average 64 years. 96/105 (91.4%), completed the trial. Urological diagnoses varied. Some participants continued to use the App and send data. The highest 60 days. Participants found the App easy to use. It provided convenient, multiple urination data for individualized care. There were few technical issues. No comparative studies were done with the conventional methods.

Conclusion: Telesonouroflowmetry through smartphone App, appear to be convenient, generating large e-urination data potential for therapeutic and surveillance purposes. Multi-center trials and comparative studies are recommended.

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Global Models for Telehealth Delivery for Older Adults

C4TA: A global model for telehealth delivery for older adults

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Overview: Prior to the COVID-19 pandemic, few older adults used telehealth services. However, the pandemic created an extraordinary challenge that spurred innovation: providers had to balance the need to protect older adults from exposure to COVID-19 with the continued need to provide them with care. For many, this meant using telehealth to provide care virtually with limited guidance on how to effectively address the unique needs of older adults.

To address the need for older-adult specific guidelines, the West Health Institute created the Collaborative for Telehealth and Aging (C4TA), which developed a comprehensive set of provider-focused recommendations. These recommendations are intended to assist providers in creating telehealth programs that are specifically tailored to meet the unique needs of older adults.

Methodology: C4TA utilized a modified Delphi process over the course of six meetings incorporating generative group discussions and asynchronous feedback to develop the Principles and Guidelines for Telehealth and Aging, which includes three principles and 18 guidelines. The principles state that telehealth should be utilized in ways that are (1) person-centered, (2) equitable and accessible, and (3) integrated and coordinated.

Benefits: Telehealth holds great potential for lowering clinic cancellation rates, reducing travel, improving patient and provider satisfaction, improved referral processes, and financial savings. Telehealth can also improve workforce efficiency. Simply,

there are not enough providers trained to care for older adults, making it hard for older adults to access the care they need. Because of this, clinical resources must be carefully deployed to maximize the services each practitioner can provide. Telehealth can reduce these problems in several ways. For example, organizations can pull from larger pools of providers to better match the right provider with the level of care needed for each telehealth encounter. In this presentation, we will describe the guidelines and the ways telehealth can support successful aging and workforce efficiency.

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Barriers and Facilitators for Implementation of Health Technology

The Asynhealth Tele Triage Tool (AT3): Mental health can't wait

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Background: \$7m of funding, 10 years of research at UC Davis and the development of the first two asynchronous telepsychiatry tools led to a patent and a dozen peer reviewed publications demonstrating the feasibility, clinical effectiveness, efficiency, and patient and provider satisfaction with asynchronous telepsychiatry. There is currently a massive need for mental health services and a shortage of psychiatrists. The use of asynchronous mental health care speeds access to care by making wait lists a thing of the past and more than doubling the number of patients able to be reviewed by psychiatrists.

Objective: Asynhealth was founded in 2022 to commercialize the process of asynchronous telepsychiatry by developing and widely implementing a more scalable hardened asynchronous triage tool to assess and monitor patients.

Methods: A third iteration of the mental health triage tool has been developed (AT3) incorporating both patient and provider portals on Apple IOS and Google Android. The patient app records patient responses using pre-recorded video questions via bot technology so that patients no longer need to make an appointment to see a provider, allowing them to access their clinical assessment anytime anywhere. The recorded video interview data is risk stratified and enhanced by Artificial Intelligence technologies and can then be reviewed via the provider portal by a psychiatrist who writes a diagnostic and treatment planning report in less than half the traditional time. This report is sent to the patient and any referring provider within 24 hours so that the treatment plan and recommendations can be rapidly implemented.

Results: AT3 will be demonstrated and discussed.

Conclusions: AT3 is a semi-automated disruptive technology which speeds patient access to psychiatric expertise and the right level of care, while making psychiatrists twice as efficient as currently through their use of this decision support tool. Increasing integration of more AI technologies and access through EMR's will make AT3 even more effective and efficient over time.

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Revolutionizing healthcare education: telehealth simulations empower next-generation interprofessional healthcare teams

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Background: Telehealth-based simulated learning experiences (SLEs) are a novel concept within the Doctor of Physical Therapy education. Integrating this concept with Interprofessional Education (IPE) has the potential to augment student learning. However, there is still a lack of dedicated and standardized education and training even though it is needed to improve the quality of the diverse range of telehealth activities.

Objective: Objectives of this study are: 1) Learn our own role as healthcare professionals in discharge planning 2) Learn the role of other healthcare professionals in discharge planning 3) Learn how to use telehealth for discharge planning meetings. This study describes the design, implementation, and assessment of a telehealth simulation-based IPE module performed as part of neurological clinical education.

Methods: 100 healthcare students i.e., 33 Physical Therapy students, 60 nursing students, and 7 Social work education students participated in a simulation module in which students observe, evaluate, and perform discharge planning in collaboration. The students filled out a pre and post-activity survey. Learning outcomes were collected in the form of two main outcome measures - RIPLS i.e., Readiness for Interprofessional Learning Scale, and SPICE R2 Instrument-Student Perceptions of Interprofessional Clinical Education-Revised Instrument, version 2.

Results: This study uses a mixed-methods approach to assess both quantitative and qualitative data. All data will be examined using descriptive statistics. Using a validated pre-post survey design, student attitudes, and perceptions were measured before and after an educational IPE activity designed to simulate interprofessional telehealth collaboration.

Conclusions: Integration of telehealth into the physical therapy curriculum is necessary as healthcare technology advances. Simulation is one strategy available to expose students to telehealth and increase student engagement. In addition, integrating interprofessional education with telehealth further enhances this innovative pedagogy required to prepare future healthcare providers.

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Creating digital health champions around the world: a case study and collaborative educational initiative

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Background: COVID delayed Universal Health Care progress while accelerating digital health adoption, particularly telemedicine. Technologies have not been implemented uniformly globally. To address the digital health divide, our team is creating a vendor-neutral learning studio with Project Echo and the UN Institute for Training and Research where teams can utilize existing software with structured guidance.

Objective: We demonstrate a sample pilot project in Manila. Filipino primary care access is limited by healthcare worker migration and cost. To test telehealth as an effective solution, a large-scale digital clinic was implemented.

Methods: In collaboration with local authorities and VSee telehealth, our clinic ran in Manila between 4-6 January 2023. A low-code low-bandwidth building-block model of software empowered the local healthcare team to build their own tailored digital health product specific to their circumstances, including telemedicine and an electronic health record. Compared to traditional software development, our building block approach allowed local designers and engineers to create their telehealth software at a fraction of the effort. Patients registered on-site, then saw a remote physician.

Results: 322 patients were treated. 218 completed registration surveys. 157 (72.7%) were female, 79 (37.1%) graduated high school. 103 (50%) were unemployed. Many had seen a doctor over 12 months ago (39.2%) and did not get a dental (86.3%) or eye examination within one year (84.4%). Most had a smartphone (69.7%). Fewer had access to internet sufficient for video calls (57.9%) or a laptop (8.5%). The most common diagnostic category was respiratory (50.3%) followed by neurological (11.2%). The majority walked (86.4%). Some lost daily wages (25.5%).

Conclusions: Telehealth can improve primary care access for disadvantaged Filipino communities. Local teams can create complex workflows using existing technological building blocks. Academic collaboration and sharing of best practices will empower teams to implement digital health more effectively.

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Developing a spontaneous speech-based artificial intelligence for Alzheimer's disease detection

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Background: Alzheimer's Disease (AD) is a neurodegenerative syndrome affecting over 35 million elderly people worldwide and ranking, with other dementia forms, as the seventh leading cause of death. Since the FDA has recently accepted promising treatments for reducing cognitive decline, there is a growing need for fast and reliable detection of AD. Meanwhile, research shows spontaneous speech provides valuable insights into brain cognitive abilities, as AD patients exhibit subtle speech alterations that a trained speech-based AI can recognize.

Objective: This study aims to present a machine learning model developed for the detection of AD based on picture description speech samples.

Method: The proposed model processes speech to predict the patient's state (Healthy/AD) and the corresponding class probabilities. It follows a multi-modal approach, analyzing both linguistic (what is said) and acoustic (how it is said) features extracted from pre-trained language models (BERT and GPT-3) and an automatic speech recognition

model (Whisper). The dataset used is the AD classification dataset, from the ADReSSo Challenge, which contains 237 Cookie Theft picture description recordings produced by cognitively normal subjects and AD-diagnosed patients. 166 recordings are used for training (with 52% AD), and 71 for testing (with 50% AD). Leave-One-Out cross-validation is used for training, feature selection, and model validation. The final prediction is determined using a soft majority voting system with 12 classifiers.

Results: On the unseen test set, the proposed model achieved an accuracy of 87.32% (ROC AUC = 94%), an F1-score of 86.57%, a specificity of 91.67%, and a sensitivity of 82.86%. An absolute Pearson correlation coefficient with a standard cognitive test (MMSE) of 0.725 is reached.

Conclusions: This study shows the potential of AI-empowered cognitive assessment tools based on speech, such as language models and automatic speech recognition, to detect AD, yielding promising results similar to existing pen-and-paper tests.

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Hospital at Home, Part 1

Driving digital transformation of the healthcare sector takes innovation & research - an innovation research project designing and testing a hospital@home model

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There is currently an urgent need for transformation of the existing healthcare system and structure both with the current transition in age demographics due to prolonged life-expectancy and expected future epidemics. We began a journey in the end of 2019, where I put a long-developed idea in to text and described a project with an overall vision that is to provide an operational and sustainable solution to the current COVID-19 situation as well as recurrent virus epidemics and beyond to other illnesses, where the main objectives are to develop:

1. An app-based solution to guide citizens, patients and HCWs during epidemics.
2. A 'hospital-at-home' solution handling home-testing, home-monitoring incl. outgoing clinical team with the potential to assess the patient at home.
3. A virtual epidemic center model with a hospital command center based in the emergency room where communication with and monitoring of patients hospitalized at home will be managed.
4. 4. Patient and staff perspectives studies, cost-effectiveness analysis of hospital-at-home-solutions when implemented in small as large scale settings.

Methods: The overall project consists of minimum four phases:

1. Pre-feasibility testing of safety and usability of solution and procedures at the hospital
2. Feasibility study evaluating the model on 19 patients admitted at home
3. RCT study evaluating if it at least it is just as good for the patients to be admitted at home
4. Further RCT studies in an avoidance of admittance design

Conclusions thus far:

- The best digital solutions are those developed in an inside out co-creation process with the users (patients and staff).
- Research is key to identify and document barriers and successes during development and testing
- Need for development of competencies among staff to use of digital tools with a mental feeling of safety and comfort
- Focus on daily routines
- Risk management and standard operating procedures
- Training of patients

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Caring for the carers: a qualitative study of informal caregivers' physical and mental well-being in hospital-at-home

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Background: With the current transition in age demographics due to prolonged life-expectancy and resulting increase in elderly people living with chronic diseases, combined with increasing shortfall of healthcare workforce professionals worldwide, there is currently an urgent need for transformation of the existing healthcare system. Telemedicine solutions in homecare is one of the pivotal tools under development primarily in middle- to high-income countries foreseen to help cover the gap in capacity for healthcare services. Moving healthcare service from hospital settings to the intimate spheres of everyday life, we are looking to a future with an increasing number

of informal caregivers playing a crucial role in providing care for relatives at home.

The qualitative data presented here is from a feasibility study of a telemedicine supported virtual hospital at home model (vHaH) part of the project Influenz-er at North Zealand Hospital in Denmark.

Objective: This study aims to investigate which needs, burdens, and benefits can be identified among informal caregivers in vHaH settings.

Methods: 16 qualitative interviews have been conducted with informal caregivers post-discharge of patients with lower tract respiratory infection admitted to vHaH settings.

Results: preliminary analysis shows that most informal caregivers are pleased to have their relative at home where they can continue their daily life and observe the condition of their loved one closely. However, the data also shows a potential burden in the increased responsibility that they experience, in the widest sense becoming a primary healthcare provider.

Conclusion: Looking to a future with more and more patients receiving treatment in an out-of-hospital setting, it is important to begin caring for the carers to optimize their mental and physical well-being in vHaH settings and to ensure sustainability of healthcare systems in modern societies.

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How to evaluate efficacy of a hospital at home model

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Background:

Development and implementation of Hospital at Home models (HaH) is necessary for various reasons.

Firstly, reduction of hospital bed count, recruitment and retention issues of hospital staff, and demographic changes of the public are challenging hospital capacity.

Secondly, by avoiding the hospital environment through a HaH admission, fragile and older patients may experience in-hospital quality care with no hospital associated complications, and higher treatment satisfaction for patients and their families. The Danish healthcare system cannot support a HaH model based on physical attendance of physicians in the patient's home. Therefore, we have developed a virtual Hospital at Home model (vHaH) – a HaH model supported by telemedicine. This model has been tested in a feasibility-study, and next step will be a randomized control trial to evaluate effectiveness.

Objective: To design a randomized controlled trial to evaluate our novel vHaH.

Methods: Through our feasibility-study, interviews with patients and primary informal caregivers (PICs) were performed, and both patients and PICs report the patient to be more physically active after being transferred home.

Informed by data from our feasibility-study and our scoping review on Hospital at Home models, we have developed our Influenz-er program theory from input (activities related to vHaH) to impact on patient and societal level, and from this model we have decided on endpoints for the RCT.

Results: Primary endpoints: patient physical activity level during admission (measured using an accelerometer on the thigh), and patient perceived safety, satisfaction, and mental wellbeing evaluated through questionnaires and interviews. Several secondary endpoints, including adverse events of special interest (AESI), length of stay (LOS), re-admission rate, mortality, process data, and economic evaluation.

Conclusions: All authority approvals have been obtained, and as per June 1st we are ready to initiate our RCT.

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Public-Private partnerships – Lessons learned from collaborations with a private company on developing a H@H monitoring solution in a hospital setting

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In the spring of 2020, we were able to start an innovation research project on a H@H model including the development of an easy-to-use digital solution that was able to support the patients and staff at the hospital in their daily interactions.

The objectives were to develop:

1. a new platform for testing, monitoring and communicating
2. a hospital-at-home self-monitoring solution with a free user-tested app that will make citizens more independent also while sick
3. an intuitive solution developed in the clinical wards and based on simple technology to avoid complicating dependencies and bottlenecks
4. a safe & highly flexible solution enabling scaling up from 1 to 10000s of patients overnight

We were all in a challenging situation none of our team members really had any experience in developing digital solutions and medical equipment, we were used to doing research and collaborate with companies about research projects.

The software company was also challenged as they were used to signing a contract for development of a digital solution but not also support their customer in getting it validated in a clinical setting.

Some of the things we did were:

- That we made a collaboration agreement and not just a sub-contract agreement
- That we had the development team from the company sitting in the hospital for as long as the pandemic let us.

Some of things that were challenging:

- Understanding each-other and understanding how and why we did not understand
- Legal discussions – finding help inside and outside of our organization

Conclusions: It took us a long time, but we have a solution that works and has been used for the past 1.5 years. But in a co-creation process you are never really finished there are always parts of the solution that can be developed further.

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Health Technology Start-ups to Improve Diagnosis and Treatment

Development of a home-monitoring device to detect pre-clinical lymphedema after breast cancer treatment

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Background: More than 20% of breast cancer patients develop secondary lymphedema as a side effect of cancer treatment¹, resulting in approximately 53,000 new diagnoses every year in the USA. Lymphedema is a serious side effect of cancer treatment. Lymphedema patients have lower quality of life, more out-of-pocket-costs and are less likely to work full time, compared to breast cancer patients without lymphedema². Early detection and intervention can help slow the progression of the disease and reduce treatment cost³.

Objective: We are developing a device that empowers breast cancer survivors to detect lymphedema early, from the comfort of their homes. Compatible with telehealth integration, we aim to provide a user-friendly solution to enable timely intervention.

Methods: We are designing a product from a need-driven innovation perspective. We are using co-creation, “fail fast” methodology and interview validation with stakeholders to develop a product that fits the patient’s needs. We focus on sustainable methods such as refurbishment of hardware.

Results: Unlike traditional diagnostics, we look for preclinical signs, measure locally on the arm with bio-impedance technology, already day 1 after surgery. We are monitoring a high-risk group consisting of 50% of all cured patients. This gives us a user population of 132,000 cancer survivors in which we aim to reduce the risk of getting chronic lymphedema by 75%.

Conclusions: Lymphedema is a prevalent side-effect of breast cancer treatment. Early detection is the key to decreasing chronic lymphedema and reducing treatment cost. We develop a home-monitoring device to detect preclinical lymphedema in the home of the patient, reducing the risk of chronic lymphedema.

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Improving outcomes in Childhood Absence Epilepsy

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Background: Childhood Absence Epilepsy (CAE) is the most prevalent form of epilepsy in children, accounting for 10-17% of all childhood epilepsies (Bashiri et al. 2022). It is characterized by frequent seizures that result in brief losses of consciousness. Difficulty identifying absence seizures from attention deficiency disorder, limited child neurologists and EEG resources has resulted in significant diagnostic delays and difficulties in monitoring therapeutic responses with significantly worse outcomes than anticipated for a “benign epilepsy” (Wirrell et al. 1997).

Objective: Develop a tool for rapid diagnosis and monitoring of CAE to speed up time to seizure freedom.

Methods: Clinicians often rely on physical observations, such as eye movements, to detect seizures. Eysz completed a multicenter clinical study, Detecting Absence Seizures using EYe-tracking (DASEY) study to collect eye movements data using a wearable eye tracker that recorded both oculomotor time series and video at 30 Hz, while also recording vEEG simultaneously. The study enrolled 168 patients with over 150 electroclinical seizures captured. Results showed machine learning algorithms had a sensitivity and specificity of more than 70% for seizures longer than 6 seconds.

Extensive customer discovery interviews revealed that clinicians, although excited about the granular continuous seizure data, preferred a solution that answered the questions: are there ongoing seizures, are they responding to treatment? Eysz's data suggested that 30 hertz video recording of eye-movements could be used to identify absence seizures, leading Eysz to pivot towards a smartphone-based solution.

Results: Eysz is developing a smartphone based solution that guides a patient thru hyperventilation while integrating video-based eye tracking and facial biometrics.

Conclusions: Combination of clinical studies and customer discovery has led to the development of a smartphone based solution that can be easily deployed to well resourced and low resources settings to solve a significant global unmet clinical need.

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Technology advances, systems lag behind

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Over the last century, biomedical technology has been rapidly advancing. Nevertheless, its full potential has remained unharnessed. Case studies reveal that implementation of new technologies benefiting patients are hampered by unintended consequences of previous regulation, misregulation, and lack of economic incentives or reimbursement structures that support use. For example, in the COVID-19 pandemic, a laboratory diagnostic test was available within days of the detection of SARS-CoV-2, on January 12th, 2020. Despite the obvious need for testing, it took more than a year to obtain reliable testing in California, at about 10x the price that was charged in Europe. The reasons included misregulation and unnecessarily complex regulatory frameworks, unchallenged monopolization of clinical testing by medical providers, and power struggles between the CDC and other government entities. Similarly, the technology to sequence the SARS-CoV-2 genome has been readily available, but was rarely used due to a lack of incentivization and funding for surveillance of emerging SARS-CoV-2 strains. Digital health could be helpful for patients in the US, however implementation is hampered by similar issues, including misregulation of privacy and data security, which often leads to more hassle for the consumer while failing to achieve the goal of maintaining privacy where it is important. Interestingly, in a global health setting more rapid applications of emerging technologies have been seen, as decision paths are significantly shortened in some LMICs. Digital health could be transformative particularly in a global health setting, where the market is not yet monopolized by powerful stakeholders who refuse to give up market share and the barrier to entry for a patient- or provider-focused tool is significantly lower.

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Design Considerations in Developing Digital Health Solutions

Healthy together: using participatory design to develop an app to promote health and wellbeing for new parents.

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Background: The postpartum period entails an increased risk of weight gain and inactivity for both parents, alongside lack of sleep and self-care. Previous studies show that new parents experience a lack of information on how to improve their health and wellbeing. Research also shows great interdependency of parents when attempting lifestyle changes, and there is a need for a holistic approach with a focus on the roles and relations of parents when designing lifestyle interventions.

Previous studies: This project builds on a PhD study exploring potentials for a participatory design-based approach to designing an ICT-based health intervention directed at new mothers with focus on physical activity and diet. Other studies have demonstrated that new parents request reliable information and personalized support from a dependable source, and that a digital format is appealing.

Objective: The objective is to create ICT based, accessible health communication to increase health and wellbeing for parents postpartum. The study focuses both on majority families and vulnerable groups, including non-native Danish speakers and mothers from more isolated areas.

Methods: A participatory design approach is applied to develop an ICT based intervention that targets both parents, focusing on health and wellbeing. Qualitative methods are used to explore the users' experience of different types of content and modes of communication.

Expected results: Development and data collection take place Summer-Fall 2023, and the expected results are insights on the needs and challenges of new parents in implementing technology-supported lifestyle changes, in addition to insights on how to co-create ICT-based lifestyle interventions.

Conclusions: The expected conclusion is that the intervention has potential to support new parents to a healthy lifestyle, with insights into how different forms of communication are experienced and valued by the participants.

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Remote monitoring heart failure patients using C-IoT technologies

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Background: Internet of Things (IoT) has found its application in almost all the areas of our everyday life. Some of the applications of IoT include turning ON/OFF lights in the house, monitoring temperature, etc. by using different kinds of sensor devices which can measure and control surrounding environments. IoT applications are further expanding into making the healthcare more digital by using sensors and monitoring devices. These devices include fitness watch, ECG monitors, etc. In this project, we will try to expand the capabilities of some of these monitoring devices even further by allowing remote monitoring of patients using wireless communication technologies like 5G and C-IoT.

Objective: The object of this project is to develop an end-to-end system which can allow us to monitor the heart rate and ECG of heart failure patient in near real-time for remote analysis and monitoring. This will allow for less hospital visits of such chronically ill patients for simple routine checks at the same time allowing patients to obtain deeper insights into their health conditions.

Methods: The method involves designing and building an end-to-end IoT communication system with a special focus on reliability of data flow from the end user to the backend systems where the data will be processed. This will involve developing custom hardware for data capture, using and developing communication protocols, and backend systems for data processing.

Results: The results will be calculated by conducting field tests of the remote monitoring system in order to understand the ease of use, reliability, and efficiency of such a system. These results will also help in evaluating effectiveness of such a system.

Conclusions: We hope to use the system developed during this project can be used to improve the Quality of Life of the patients using it and get them to take active part in the recovery process.

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Virtual autonomous physiotherapist agent: a feasible and effective tool for delivering virtual physical therapy to patients with chronic pulmonary disorders

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Background: Patients with chronic pulmonary disorders often face challenges accessing physical therapy due to geographic barriers or their inability to leave their homes, resulting in poor adherence to prescribed exercises and suboptimal outcomes. The Virtual Autonomous Physiotherapist Agent (VAPA) was developed to address this issue by providing patients with virtual physical therapy sessions.

Objective: Our combined results of three studies aimed to evaluate the feasibility and effectiveness of VAPA in improving physical function, exercise adherence, and quality of life in patients with chronic pulmonary disorders.

Methods: Three randomized controlled trials were conducted, including 113 patients with chronic pulmonary disorders who received either VAPA or standard care. VAPA sessions were delivered via a mobile-based platform, offering personalized exercise programs and real-time feedback from the virtual agent. Physical function, exercise adherence, and quality of life were assessed at baseline and after 3, 6, and 9 months of intervention.

Results: The VAPA group demonstrated to be equally effective as standard care with respect to exercise capacity and quality of life. Furthermore, patient satisfaction, adherence, and safety were high for all participants in the VAPA group.

Conclusion: VAPA is a feasible tool for delivering virtual physical therapy to patients with chronic pulmonary disorders. Further research is needed to optimize VAPA and explore its potential for physical therapy in other settings and patient populations. The technology's future possibilities for different patient groups – especially if combined with other technologies – are vast and have the potential to provide a meaningful alternative to patients with difficulties accessing physical therapy.

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Hospital At Home, Part 2: Challenges and Facilitators for a Large Scale Implementation of Hospital at Home Interventions – Where do Cleveland Clinic and UC Davis Hospitals See the Potentials and the Challenges?

Driving innovation through care at home models

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The majority of healthcare services are currently delivered in clinics and facilities, which are facing challenges due to increasing disease burden and an aging population. This has led to overwhelmed care teams, strained healthcare settings, poor patient experiences, and high costs. To address these issues and improve care quality, access, and outcomes, there is growing interest in delivering care in the home. In this study, we aimed to develop a comprehensive Care at Home framework that identifies the types of services that can be effectively provided in home settings and outlines the necessary infrastructure for successful implementation. Through literature review, expert input, and interviews with organizations, we have created a framework that encompasses the entire care-at-home continuum, highlighting the services that can be safely delivered outside of traditional facilities. Additionally, the framework emphasizes the essential components needed to establish and operationalize a successful

Care at Home program. This research presents a significant step forward in reimagining patient care, offering the potential to alleviate strain on existing healthcare settings while improving care quality and access. We invite readers to explore our comprehensive framework and discover the transformative possibilities of delivering care in the comfort of patients' homes.

Background: Today the majority of care services are delivered in clinics, physicians' offices and facilities. With increasing disease burden and an aging population, health systems are experiencing hospital beds and clinics at capacity, physicians and care teams that are overextended and burnt out, poor patient experience, and higher per-patient expenditures than anywhere else in the world. There is a desire to provide higher-quality care and improve access, clinical outcomes and experiences. Delivering care in the home has emerged as not only a possible solution to points of friction, but a way to transform how we think about caring for patients.

Objective: To develop a Care at Home framework to represent the types of services that are being or can be delivered in the home setting and the infrastructure necessary to do so successfully.

Methods: Based on findings from a literature search, subject matter expert input, and interviews with 10 organizations, we developed a Care at Home framework to represent the types of services that are being or can be delivered in the home setting and the infrastructure necessary to doing so successfully.

Results: Recognized as a potential solution to address the existing points of friction, home-based care has the power to revolutionize patient care. In light of this, our research endeavors have yielded a comprehensive framework that outlines the care-at-home continuum and identifies the types of services that can be effectively and safely provided outside of traditional facilities.

Moreover, our framework goes beyond identifying services; it also sheds light on the essential infrastructure required to operationalize a successful Care at Home program. By understanding the key components necessary for implementation, we can pave the way for seamless integration and optimal outcomes in home-based care delivery.

Conclusions: This research represents a significant step forward in reimagining how we care for patients. It holds the potential to alleviate the strain on existing healthcare settings, while simultaneously elevating the overall quality of care and improving patient access. We invite you to delve into our comprehensive framework and explore the transformative possibilities of delivering care in the comfort of patients' homes.

Together, let us embark on this journey towards a future where care at home becomes the cornerstone of a patient-centered, efficient, and sustainable healthcare system.

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Improving Access, Empathy and Training with Technology

AI based social robot for persons with dementia: an exploratory study

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Background: Over 50 million people worldwide are living with dementia. A social robot called LOVOT has artificial intelligence and sensor technologies built in has been manufactured in Japan.

Objective: To explore how social robot LOVOT interacts with persons with dementia and how health care professionals experience working with LOVOT in their interaction with persons with dementia.

Methods: The study was carried out at specialized units for persons with dementia in 3 nursing homes. The interaction between the persons with dementia and LOVOT was tested in both individual sessions for 4 weeks and group sessions for 12 weeks. A total of 42 persons were included in the study, of which 12 were allocated to the individual sessions. A triangulation of data collection techniques was used: the World Health Organization-5 questionnaire, face scale, participant observation, and semi structured focus group interviews with health care professionals (n=3).

Results: There were no clinically significant changes in the well-being of the persons with dementia followed in the individual or group interaction sessions over time. The results from the face scale showed that in both the individual and group sessions, persons with dementia tended to express more positive facial expressions after the sessions. Findings on how persons with dementia experienced their interaction with LOVOT are: Opens up communication; is accepted and creates joy; induces feelings of care; can create an overstimulation of feelings; is not accepted; is perceived as an animal. Health care professionals' expressed that the artificial behavior seems natural and it is a communication tool.

Conclusions: LOVOT had positive effects, opened up for communication, and facilitated interpersonal interaction. Few residents were overstimulated by emotions after interacting with LOVOT. Health care professionals accepted the social robot and see it as a new tool in the work with persons with dementia.

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Robots in the taxonomy of pediatric telehealth

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Background: As interactive health technologies continue to evolve and enter healthcare fields for patient use, it is urgent to define classifications of emerging digital health technologies. Telecare and telehealth applications have become increasingly popular due to their promise of increased access. As a result, the field of telehealth has grown over the past decade with an increasing number of applications, a variety of technologies, and newly introduced terminology. However, most of the existing applications are centred around adults and clinical users. Homebound pediatric patients have unique, out-of-hospital, behavioral and developmental needs that must be considered in the continuum of care. An understanding of the classification for telehealth robots in the pediatric telehealth taxonomy will bring conceptual clarity to this emerging digital health intervention.

Objective: Our objective is to present a taxonomy of telehealth that includes pediatric, home-based, telecare interventions that includes patient-centered technologies such as telerobots.

Methods: We conducted a systematic literature review and an iterative adaption process of different telehealth and telemedicine taxonomies to create a pilot pediatric telehealth taxonomy model (Figure 1).

Results: We found that telerobot interventions fit within existing telehealth taxonomies that include evaluation of three dimensions: functionality, application, technology. Evaluation of telerobot functionality includes the daily contexts of a child’s life during treatment and recovery. Evaluation of technology application includes the medical treatment modality where homebound children are engaged in a flipped model of telecare—where the patient is using the tele-technology from home for improved treatment and recovery experiences. Evaluation of the technology includes aspects such as synchronicity, connectivity, and effectiveness of home devices.

Conclusions: Taxonomy development and refinement is an iterative process. This work is a first step at classification of home-based, pediatric telehealth robots. Future work may enhance development by testing, revising, and verifying this taxonomy to include other home-based innovative digital health interventions such as social robots, chat bots, conversational agents, and others.

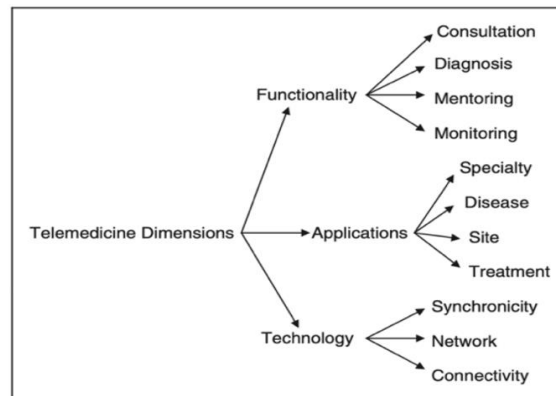


Figure 1: Taxonomy of Telehealth Systems

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Leveraging first-person immersive narratives to accelerate lived experience and build adaptive skills at scale

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Background: Workforce deployment and staff development healthcare leaders revealed that medical students and clinical staff may feel unprepared for their day-to-day roles, despite having acquired the necessary hard skills to perform on the job. The knowledge and insights from years of hands-on experience interacting with individuals and their loved ones are hard to transfer and often prevent proactive care practices. The internal and external conflicts that arise from reactive care lead to emotional burnout and compassion fatigue.

Objective: Demonstrate the importance of building adaptive skills by accelerating lived knowledge experience that better prepares staff for their day-to-day roles - quickly and efficiently onboard and retain staff, and avoid burnout.

Methods: VR (fully immersive with headset) and Web immersive technology enable scalable experiential learning opportunities that allow us to create first-person simulations which provide healthcare providers and informal caregivers an opportunity to step into the shoes of the people they care for and transform the way they care.

Results: Empowering healthcare professionals to understand the hidden perspectives of health conditions allows them to meet people where they are in their health journey, thus contributing to better life experiences and better health outcomes. Embodied Labs has been used to train future healthcare professionals and staff across the care ecosystem and within local, state, and federal government institutions (VAs, Agency on Aging, DHS), Senior Living organizations, and academic institutions, amongst other verticals.

Conclusions: Combining the power of VR immersive training (proven to enable 4 x higher retention rate of learning, 4 x faster learning than traditional methods, and 2.75 x greater confidence to perform the job) and Embodied Labs first-person empathy-building narratives provides transformational learning opportunities that build the necessary adaptive skills to transform the way we care.

Our customers report that Embodied Labs is effective because it is accessible, actionable, engaging, flexible, hands-on, and relevant.

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Policy and Practice Issues in Digital Health and Digital Equity

Frameworks for digital health equity

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Background: Digital health equity is defined as access to digital healthcare, appropriate design of solutions, and the benefits and outcomes of digital health experiences. Health and healthcare are increasingly dependent on the internet and digital solutions. However, low-income, racial and ethnic minority neighborhoods, and rural communities continue to face digital and health disparities. Development of effective real-world interventions to address digital health equity are complex undertakings. There is sparse evidence that informs how to effectively plan and implement community-engaged interventions for digital health equity.

Objective: This aim of this study was to fill this gap in conceptual frameworks for digital health interventions that fulfill health equity outcomes.

Methods: We conducted a systematic scoping review using the PRISMA-SCR approach to understand the state of the science in digital health equity frameworks. We also conducted key informant interviews of representatives of digital inclusion, community health, senior services organizations, and public agencies.

Results: There is a limited literature on frameworks for digital health equity but what exists relies on socioecological theories. We uncovered a number of benefits, challenges, and strategies employed by community organizations to address digital health equity. While internet access was essential for digital health, connectivity alone was not sufficient. The diversity of communities and their local conditions highlights that innovative and tailored approaches are necessary. We will continue to learn from the examples and evidence that emerges from community collaborations and coalitions to address the priorities of digital health equity.

Conclusions: Frameworks are necessary for creating interventions to connect the middle- and last-mile of broadband and deliver digital solutions for health equity and generate evidence of impact. Collaborative efforts will contribute to knowledge in the science of engagement, an emerging field that is ripe for foundational models and exemplars of interventions based on sound principles.

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Telehealth in California: Institutionalizing policy

Sunne Wright McPeak

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Background: The California Emerging Technology Fund (CETF) is a statewide non-profit organization directed to be established by the California Public Utilities Commission (CPUC) in 2005 with an assigned mission to close the Digital Divide. CETF has 15 years of experience working with all stakeholders throughout California to accelerate both deployment and adoption of broadband Internet. Additionally, CETF works at the nexus between broadband and healthcare access for Telehealth. Research shows that people adopt technology when it is relevant to them and one of the most valued uses is for healthcare.

Objective: A major objective of CETF is to institutionalize Telehealth in State government with assigned accountability for improving patient outcomes and overall population health. It was critical to first understand the status of Telehealth in California; identify the gaps and barriers to optimizing Telehealth to improve the health status for Californians; and inform an Action Plan to advance Telehealth policy and funding in California.

Methods: The CETF strategy consists of the following:

- Conduct a Telehealth Pilot Project in 5 Skilled Nursing Facilities during COVID-19 to document lessons and barriers to Telehealth access and implementation to inform public policy;
- Convene Fact-Finding Listening Conferences, Delivering on the Promise of Telehealth to Improve Health Status in California, which brought together the Governor's Office, the Legislature, thought leaders and key stakeholders, including community clinics/FQHCs servicing medically-underserved populations, senior care facilities from skilled nursing and assisted living, managed health care plans/insurers (Public/Private), medical centers, and Veterans Affairs Administration and philanthropy;
- Conduct Legislative Briefing on Digital Equity with Legislators to lay the groundwork for policies for digitally- and medically-disadvantaged communities;
- Develop the CETF Healthcare Partnership for the FCC COVID-19 Telehealth Program (\$860,000 funded by FCC) that supported 10 healthcare-provider organizations with Telehealth equipment and technical assistance to implement Telehealth in Senior Care Facilities, Community and Tribal Clinics and FQHCs, and a remote Critical Access Hospital.

Results: The collective results yielded Action Plan Recommendations to: 1) Enact legislation to permanently reimburse Telehealth services comparable to in-person visits; 2) Invest in and ensure ubiquitous high-speed Internet infrastructure to support Telehealth for all patients and providers; 3) Institutionalize Telehealth with accountability for improving patient outcomes and overall population health. Further, Telehealth was accelerated during the pandemic and demonstrated that government and healthcare systems have the ability to move quickly and efficiently to implement Telehealth. COVID-19 was the impetus for rapid deployment of Telehealth and has become an essential mode of healthcare access for medically- and digitally-disadvantaged communities.

Conclusions: It is imperative that the State institutionalize Telehealth within government that assigns accountability for improving patient outcomes and overall population health.

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Broadband for All & state digital equity planning process: closing California's digital divide and achieving equitable outcomes in health

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Background: Access to broadband and internet in today's technology-dependent world is the difference between being fully engaged and being cut off.

Yet, California has a persistent digital divide where millions lack adequate broadband service or the devices and skills to use it. This leads to disparate outcomes and perpetuates inequities that impact the most vulnerable among us.

Broadband for All is the state's overarching program to close the digital divide. Its goals are that all Californians have access to high-performance broadband at home, schools, libraries, and businesses; have access to affordable internet service and devices, and the skills and training to realize social and economic benefits.

The State has invested billions of dollars to improve broadband access and fund infrastructure expansion in the state, and widely promotes the Affordable Connectivity Program which provides a benefit to residents to make home internet service for affordable.

Despite these investments and efforts, additional funding is needed to achieve Broadband for All.

Objective: CDT is developing a State Digital Equity Plan (SDEP) with a grant from the National Telecommunications Information Administration (NTIA). The SDEP must identify digital equity barriers for covered populations and develop strategies to overcome those barriers to empower outcomes in key policy priorities including health.

Methods: CDT has developed an extensive planning process to allow for stakeholder input into the development of the SDEP including:

- Statewide Planning Group
- Outcome Area Working Groups
- Digital Equity Surveys
- Regional Planning Workshops
- Stakeholder Engagement

Results: CDT's digital equity planning process has led to meaningful, bidirectional engagement with thousands of California residents and stakeholders. CDT will develop a draft SDEP and post it for public comment. A final SDEP will incorporate public comment and be submitted to the NTIA in November.

Conclusions: Studies indicate a strong connection between digital equity and health outcomes. California will leverage additional federal digital equity capacity grants to implement the SDEP and increase equitable outcomes in all areas of life, including health.

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Assessment of the Value of AI Technologies in Health Care, Part 2

Understanding the opportunities and limits of large language models from a technical perspective

Gerald Friedland, PhD

Adjunct faculty, fellow, and Principal Scientist, EECS Department, UC Berkeley, CITRIS, and Amazon AWS

The talk is designed to provide a high-level overview of how Large Language Models (LLMs) operate and what to expect from them, specifically in the context of healthcare. Rooted in the principles of the John von Neumann architecture, the talk will elucidate how LLMs function as a giant, generalizing memory of responses. Rather than explicitly with pointers, the memory is addressed by natural language prompts that can be built up incrementally. This conceptualization fosters an understanding of the LLMs' basic working mechanism and provides a basis for realistic expectations.

Crucial to this discussion is the examination of 'hallucinations' within LLMs' outputs — instances where the model creates responses that are wrong yet presents them with high confidence. By delving into why hallucinations occur, this talk aims to clarify the strengths and limitations of LLMs. Techniques to identify and manage these hallucinations will also be discussed. The presentation will intersperse conceptual explanation with practical examples, bringing to light the applicability and potential challenges of LLMs in healthcare. I hope the audience leaves with the necessary understanding to leverage the power of LLMs in their health-related endeavors.

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Not just ChatGPT: Generative AI's impact on scalable healthcare

Shomit Ghose

Partner, Clearvision Ventures

Twin forces impact the practice of healthcare today. On one side, we have the challenge of providing healthcare access, with some 45% of the WHO's member states provisioning fewer than one physician per 1,000 residents. Even in advanced economies such as the US, some 30 million people remain without access to proper care. On the other side, we have the opportunity presented by artificial intelligence. AI can serve as the needed force multiplier within healthcare systems to help provide care at scale. But meeting the challenge with the opportunity requires that participants across the healthcare spectrum understand how the latest in AI technology, including generative AI models such as transformers and diffusion, can be brought to bear in the traditional areas of diagnosis and treatment. How might the latest advances in generative AI help scale the provisioning of healthcare – while also spurring innovation, investment and entrepreneurship – in areas as diverse as disease prediction to drug design?

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Bridging the Digital Divide: ACTIVATE's Impact on Diabetes and Hypertension Management in Rural and Agricultural Communities

The ACTIVATE platform for diabetes and hypertension: digital health equity outcomes

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Background: Diabetes and hypertension are among the most prevalent chronic illnesses facing the United States. The prevalence increases among older age groups and there are disparities in rates of serious complications from these conditions among older non-Hispanic Black and Hispanic Americans compared with non-Hispanic White Americans. The convergence of high prevalence and barriers due to social drivers of health makes chronic illness management more challenging for certain populations such as residents of rural communities, older adults, and those whose primary language is not English. Community health centers (CHCs) who care for the individuals in these communities struggle to implement these evidence-based programs in ways that are feasible and sustainable.

Objective: ACTIVATE is a digital health and remote patient monitoring (RPM) program that aimed to address health disparities related to diabetes and hypertension and technology adoption barriers in rural and agricultural communities.

Methods: We demonstrated community codesign in development of the technology and intervention. Participants were recruited by health center staff to participate in RPM, health coaching, and telehealth. Pre- and post-intervention outcomes included hemoglobin A1c (A1c) for participants with diabetes and blood pressure for those with hypertension, evaluated at 6 months.

Results: A cohort of 243 adults and older adults with diabetes and/or hypertension participated in a pilot study from Apr. 2021 to Dec. 2022. The participants embraced the technology, the health center staff and providers successfully integrated the program into their clinical services. Participants with diabetes achieved a mean reduction in hemoglobin A1c of 3.5 points. Those with hypertension reduced blood pressure by a mean of 20 points systolic and 5 points diastolic.

Conclusions: ACTIVATE project is a promising model for digital health that fulfills the needs of CHCs and their patients.

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ACTIVATE: Lessons learned and implications for clinical practice in a community health center

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Background: Community health centers across the country have struggled to address the need for virtual visits and remote monitoring of chronic illness while facing COVID-19, digital inequities, and persistent health disparities.

Objective: The ACTIVATE digital health project was implemented in a community health center serving a medically underserved agricultural region of California to improve the quality of care and self-management capacity of patients with diabetes and hypertension.

Methods: We instituted a teamlet composed of provider, health coach, and digital health navigator to deliver the intervention. We created new clinic workflows and communications including weekly huddles, virtual visits with patients, and review of data from remote patient monitoring devices.

Results: We will present the collaborative model, lessons learned, and ongoing challenges for sustainability from the perspectives of community health center executives and medical leaders.

Conclusions: The tools and insights generated from the experience of implementing digital health, the innovative co-design approach, and the partnership may assist other community health centers who seek to improve the health and engagement of patients with diabetes and hypertension.

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