

Adoption and Challenges of Digital Technologies in Home Care for Older Adults in Austria: Bridging Practical and Managerial Perspectives

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Abstract: The integration of digital technologies (monitoring, health system software, care support, etc.) into home care for older adults is becoming increasingly important as care demands rise. This paper explores the key challenges and opportunities of adopting technologies such as artificial intelligence, wearables, and remote monitoring systems in home care, especially based on Austria's healthcare sector. Through an in-depth interview study, this study addresses three critical questions: (1) How can management drive workforce adoption of digital technologies? (2) What are the main barriers and opportunities for technology integration in home care? (3) How can technology balance privacy, independence, and regulatory challenges? Our findings show that while digital tools have the potential to improve the quality and efficiency of care and support the independence of older adults, caregiver resistance, financial constraints, and regulatory challenges remain significant barriers. However, their adoption is hindered by challenges including financial constraints, regulatory complexities, and the need to address privacy concerns and user engagement among older adults. Effective management strategies, flexible solutions, and supportive regulatory frameworks are key to overcoming these barriers. By examining both practical and managerial perspectives, this study offers valuable insights for healthcare providers, policymakers, and industry leaders looking to enhance technology adoption in home care. The paper concludes with recommendations for fostering successful technology integration and improving patient outcomes in home care for older adults.

1 INTRODUCTION

With an increasingly aging population, traditional home care models are experiencing growing demands and evolving needs, necessitating innovative approaches to deliver high-quality care to older adults (Carvalho et al., 2017). By 2050, the global population of individuals aged 60 and older is expected to reach 2.1 billion, almost doubling from 1 billion in 2020 (WHO, 2020). As more people prefer to age at home, the need for efficient, accessible, and affordable home care services continues to grow (Carvalho et al., 2017). In Europe, 77% of older adults prefer to remain in their own home as they age rather than being institutionalized (Ratnayake et al., 2022).

Digital health technologies encompass evidence-based, software-driven tools and connected devices - such as digital therapeutics, wearable sensors, telehealth platforms, and clinical decision support

systems - designed to deliver therapeutic outcomes, enhance healthcare delivery, and support self-management (DTx Alliance, 2023). Emerging technologies are being positioned as transformative solutions to address these challenges, including accessibility, cost, and the shortage of healthcare professionals (Bertolazzi et al., 2024; Mumtaz et al., 2023). Telemedicine, encompassing services such as telemonitoring and video consultations, seeks to enhance healthcare accessibility and convenience by enabling patients to receive medical care from the comfort of their own homes (Haleem et al., 2021). Evidence suggests that telemedicine solutions are not only user-friendly but also effective in enhancing the quality of care provided remotely (Haleem et al., 2021). For instance, during the COVID-19 pandemic, telemedicine became invaluable in maintaining patient access to healthcare while minimizing infection risks (Chu et al., 2022; Haimi and

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Sergienko, 2024). This technology enabled healthcare providers to monitor chronic conditions, conduct routine check-ups, and offer mental health support—all without requiring in-person visits (Chu et al., 2022; Goldberg et al., 2022). E-prescription systems streamline the prescription process by allowing providers to send prescriptions electronically, which can reduce medication errors and increase time efficiency, although challenges remain with verifying that patients' medication lists are accurate and up-to-date, especially when dosages or medications change (Hareem et al., 2023). Mobile health uses applications and wearable devices to support chronic disease management, while digital health applications and AI-driven systems further enhance monitoring and decision-making, especially for conditions requiring continuous oversight (Sousa et al., 2023). These innovations have the potential to improve care efficiency, support independent living, and enhance the overall quality of life for older adults (Bhattarai and Phillips, 2017; De Santis et al., 2023). However, their integration faces numerous barriers including workforce resistance, high implementation costs, and regulatory complexities (i.e., data privacy according to the GDPR) (Carvalho et al., 2017; WHO, 2017). Bridging the gap between management perspectives and practical caregiving settings is crucial for fostering successful technology adoption, as it ensures alignment between operational goals and real-world care delivery, ultimately enhancing care outcomes (Stoumpos et al., 2023).

In Austria, where 19% of the population is aged 65 or older, the adoption of digital technologies in home care is gaining attention, but challenges remain on both practical and systemic levels (STATISTIK AUSTRIA, 2021). Austria's eHealth strategy aims to strengthen digital healthcare integration by expanding access to services such as the electronic health record (also known as "ELGA") and telemedicine options (BMSGPK, 2024). This initiative addresses accessibility, telehealth development, and digital skill enhancement among healthcare providers to support the aging population more effectively (BMSGPK, 2024). Understanding the barriers to digitalization in healthcare requires insights from both clinical and managerial perspectives. This paper provides an interview of an Austrian healthcare leader, who has experience in both nursing and leadership roles within the care industry. Drawing from these insights, this study aims to explore the dual perspectives of management and caregiving in the adoption of technologies in home care settings.

For this reason, the research focuses on three key questions: (1) How can management drive workforce adoption of digital technologies? (2) What are the main barriers and opportunities for integrating technology into home care? (3) And how can these technologies balance privacy, independence, and regulatory challenges? Addressing these questions will provide a deeper understanding of how to effectively leverage technology to enhance home care services for older adults, ensuring sustainable and high-quality care delivery.

2 METHODS

A qualitative semi-structured interview was conducted with a healthcare executive from Austria, who brings extensive experience in both clinical care and managerial roles within older adult care settings. The interview was conducted in October 2024, for a duration of 60-minutes. The interview aimed to gain in-depth insights into the participant's perspectives on the adoption of digital technologies in care, with a particular focus in home care.

A pre-defined set of open-ended questions guided the discussion to address three central research questions mentioned above. An interview guide was developed based on current literature to address known gaps in digital health integration for older adults, gathering detailed insights into six key areas of digital transformation in their care: (1) adoption of AI and Internet of Things (IoT) technologies, (2) impact of telehealth and remote monitoring, (3) data security and privacy concerns, (4) interoperability of digital tools, (5) user engagement, and (6) future trends and innovations. The complete interview guide is included in the appendix for reference and transparency.

The recorded interview was transcribed verbatim to ensure accuracy and preserve the richness of the participant's responses. Following transcription, the data was analyzed using thematic coding in the qualitative analysis software Atlas.ti. While the initial design aimed to employ an inductive approach, the use of a literature-informed interview guide indicates a blend of inductive and deductive elements. Specifically, the themes were grounded in the participant's responses but were also shaped by the pre-existing categories derived from the literature.

The thematic coding process helped to organize and interpret the participant's insights into distinct themes relevant to digital transformation in older adult care. By systematically analyzing the data, this approach captured both emergent patterns and

context-specific nuances, addressing the study's research questions while balancing inductive exploration and deductive structure. This process provided a structured yet flexible framework for identifying core issues and insights that addressed the study's research questions.

3 RESULTS

The analysis of the interview provided rich insights into the integration of digital technologies in home care for older adults. Several key themes emerged from the data, highlighting both opportunities and barriers for effective adoption of technologies.

3.1 Workforce Adoption and Resistance to Digital Technologies

One of the primary themes were the resistance of the workforce to adopting new digital technologies. The interviewee noted that this resistance is often due to the perceived complexity of technologies, especially AI and IoT devices, which caregivers may feel unequipped to use (Stoumpos et al., 2023). The lack of digital literacy among the workforce was a recurring barrier, with many staff members expressing concerns about the increased workload associated with learning and using these technologies (Dunn and Hazzard, 2019; Oh et al., 2021). On top of that, caregivers were particularly resistant to AI-driven tools, which they viewed as potentially disruptive to their established workflows.

Not to mention, a significant portion of caregivers in Austria are not native German speakers, which can create language barriers that further impact their digital literacy (Carlos and Wilson, 2018; Trukeschitz et al., 2022, 2022). These caregivers may face additional challenges in understanding digital tools and technologies, particularly when training materials or user interfaces are only available in German. As the demand for foreign workers in the care sector continues to grow, addressing these language and training barriers becomes increasingly critical to ensuring effective adoption of digital solutions. Additionally, caregivers were particularly resistant to AI-driven tools, which they viewed as potentially disruptive to their established workflows.

The role of management was also identified as pivotal in mitigating this resistance. The participant highlighted that management-led training programs and clear communication on the benefits of digital tools can significantly improve workforce adoption. In addition, hands-on training, involvement in

decision-making processes, and demonstrating how digital tools can alleviate manual tasks were noted as effective strategies to build workforce trust in technology. Furthermore, the participant also emphasized the importance of incremental implementation, such as starting with small pilot programs to build familiarity before rolling out technologies on a larger scale.

3.2 Barriers and Opportunities for Technology Integration

The participant pointed out multiple barriers to the integration of digital technologies, particularly financial constraints. Budget limitations were a major concern, especially for smaller care providers who lack the resources to implement and sustain new technologies like care management systems, remote monitoring systems or wearables. The executive noted that while digital health promises improved efficiency, the upfront cost and maintenance expenses are significant deterrents to adoption. Additionally, infrastructure limitations, such as inadequate internet connectivity in rural areas, were mentioned as obstacles to technology deployment. Conversely, the participant highlighted several opportunities for enhancing technology integration. They described successful examples of wearable devices like fall detection sensors and remote health monitoring tools that maintain anonymity to address privacy concerns. These technologies have had a direct positive impact on patient safety and have significantly reduced the workload for caregivers (e.g., unnecessary visits). Further to that point, the executive suggested that public-private partnerships could help alleviate financial burdens through subsidies, grants, and shared infrastructure initiatives, particularly for care agencies serving low-income or rural populations in Austria.

3.3 Data Privacy, Regulatory Challenges, and Interoperability

Data privacy and regulatory compliance emerged as significant concerns regarding technology integration in home care (Sirur et al., 2018). The participant noted that Austria's strict data protection regulations, such as the GDPR, present considerable challenges for implementing technologies that collect sensitive health information. Specific concerns included patient consent, data ownership, and the management of data across different care settings. To overcome these challenges, the participant recommended adopting privacy-by-design principles, ensuring that data protection is built into the development and

implementation stages of digital health solutions. Transparent communication with older adults and families about data collection and usage was also highlighted as crucial for building trust and facilitating technology acceptance. The executive emphasized that regulatory clarity and support are needed to provide a safe environment for the adoption of technologies.

The challenges of interoperability among digital tools used in home care settings was also raised as a point of concern. The participant noted that most current technologies do not effectively integrate with existing healthcare information systems, such as those used in hospitals and pharmacies. This lack of interoperability results in fragmented patient data, which hinders seamless care coordination and complicates the process of managing patient transitions between home care and acute care settings.

Taking this further, the participant identified a need for standardized protocols to enable different digital health systems to communicate effectively. She suggested that developing national interoperability standards could be a key step in solving this issue, which would ultimately improve patient care quality and ensure more efficient use of technology across different levels of the healthcare system. In the same light, the participant also mentioned that involving technology developers in conversations with care providers could help design solutions that address specific interoperability needs.

3.4 Patient and Family Engagement

The role of digital technologies in enhancing patient and family engagement was another key theme that emerged during analysis. The participant shared that technologies such as patient portals and wearable health devices have significantly improved communication with families, allowing them to stay informed about the health and well-being of their loved ones. From clinical experience, the participant observed that families felt more connected to the care process and were more likely to be involved in decision-making when they had access to real-time health information. However, they also noted several challenges in engaging older adults and their families, particularly those with limited experience using digital tools. The participant mentioned that many older adults were reluctant to use digital devices due to a lack of familiarity and a fear of technology. To overcome these challenges, it was recommended to provide education sessions to build digital literacy and ensure comfort in using these tools. Additionally, the participant also noted the importance of designing

user-friendly interfaces with intuitive features to facilitate better engagement.

3.5 Innovations Driving Future Care

The participant envisions a future of home care for older adults driven by emerging technologies, focusing on personalized and proactive care. They highlighted several promising trends and innovations that could enhance care quality and efficiency.

A key trend is AI-driven predictive analytics, which provides early warnings of health issues by analyzing patient data patterns. This enables timely interventions, reducing emergency service needs and improving patient outcomes. By identifying risk factors early, predictive analytics supports preventive care, which is especially crucial for aging populations at greater risk of chronic conditions.

Wearable sensor technology is another innovation gaining traction. These devices, such as health trackers and fall detection systems, monitor vital signs and activity levels in real-time. Wearable sensors empower older adults to manage their health actively while providing caregivers with valuable data for shared decision-making, contributing to greater independence without intrusive visits.

The participant also mentioned temperature-based monitoring technology, which uses thermal imaging to detect activity in a non-intrusive way, maintaining privacy. Unlike cameras, temperature-based systems provide essential information about well-being without capturing identifiable images, aligning with privacy concerns while ensuring safety.

Smart home integration is another promising development. The use of smart sensors and automated home systems allows for enhanced monitoring of the living environment, detecting potential hazards and alerting caregivers when necessary. These technologies support older adults in maintaining independence at home while providing additional security.

Voice-assisted technologies were also mentioned during the interview. Voice technology for digital documentation and communication could particularly benefit non-native caregivers by reducing manual record-keeping by writing down completed tasks. This simplifies administrative workloads and ensures accurate, timely documentation, which is essential for quality care.

Robotics in care is another area of interest. Mechanical aids that assist older adults in standing up or moving around provide critical support without replacing human interaction. These aids may help

maintain patient independence and reduce physical strain on caregivers.

Lastly, the participant emphasized the need for flexible monitoring systems that adapt to individual needs, offering greater security or freedom depending on each patient's circumstances. This flexibility ensures that technology supports personalized care rather than imposing rigid protocols.

Finally, the executive highlighted the importance of investing in technologies that directly benefit older adults and caregivers, such as tools that reduce manual tasks or improve health monitoring. There is a need for ongoing research into cost-effectiveness and user acceptance of these technologies to ensure that investments lead to sustainable improvements in care quality. Collaboration between healthcare providers and technology developers was recommended to create solutions that address the unique needs of the aging population, ensuring a high level of user satisfaction and meaningful health outcomes.

4 DISCUSSION

The results of this study reveal both the opportunities and barriers associated with integrating digital technologies into home care for older adults. Reflecting on these findings, it becomes evident that while there is great potential for enhancing care delivery through digital tools, significant systemic, workforce, and cultural challenges must be addressed to ensure effective implementation.

4.1 Workforce Adoption: More than Just Training

The workforce resistance to adopting digital tools was a central theme, and while training programs and gradual rollouts are useful, this finding suggests a deeper, systemic issue regarding the culture of care. Digital transformation in healthcare often conflicts with existing values and routines, particularly in settings where caregivers are accustomed to direct, human-centered interactions (Stoumpos et al., 2023). Training alone may not address underlying fears of job replacement or increased surveillance that often accompany the introduction of digital tools (Stoumpos et al., 2023). There is a need for management strategies that go beyond skill-building and address cultural and emotional aspects of technology adoption. Furthermore, developing narratives that position technology as a tool that enhances human care, rather than as a replacement,

could play a crucial role in reducing workforce resistance. For instance, by emphasizing how digital tools can support caregivers in routine tasks, allowing them to focus more on meaningful, patient-centered interactions, these narratives can help alleviate concerns about job displacement of current caregivers. Moreover, framing technology as an ally in delivering higher-quality, personalized care by reducing administrative burden, improving efficiency, and enabling proactive health management can foster a sense of empowerment among caregivers rather than fear or apprehension.

4.2 Financial and Regulatory Challenges: A Need for Innovation in Policy

The challenges related to financial and regulatory barriers underscore a critical gap between innovation and practical feasibility. The high initial costs and ongoing expenses associated with digital health tools, particularly in the context of home care, limit the adoption potential for smaller care providers. This reflects a broader inequity in the healthcare sector, where access to advanced technologies is often determined by financial capacity (Stoumpos et al., 2023; Weik et al., 2024).

From a regulatory perspective, the emphasis on compliance with strict data protection regulations like GDPR is a double-edged sword. While protecting patient data is crucial, the burden of compliance disproportionately affects smaller providers who may lack the resources to effectively navigate these complexities (Filippis et al., 2024; Sirur et al., 2018). This finding raises questions about the adequacy of current regulatory frameworks in supporting innovation. There may be a need for adaptive regulation, where policies evolve in tandem with technological advancements, allowing for both innovation and protection (Martin et al., 2019; Wilkinson, 2018).

4.3 Interoperability: A Persistent and Systemic Issue

The issue of interoperability between digital tools and healthcare systems reflects a fundamental limitation in current healthcare infrastructure (Bharath Perugu et al., 2023; Torab-Miandoab et al., 2023). Despite the widespread recognition of the benefits of seamless data sharing, achieving interoperability remains intangible due to the lack of standardized protocols and the fragmented nature of health IT systems (Vest and Gamm, 2010). This has been a persistent problem

across healthcare systems globally, limiting the potential for coordinated, integrated care and poses risks to patient safety due to potential information gaps (Ali et al., 2024).

The recommendation for national interoperability standards is not new; however, the lack of progress suggests that there are significant political, technical, and organizational barriers to achieving this goal (Adler-Milstein et al., 2017). In accordance to related work, the absence of unified policies and the presence of information blocking - where entities intentionally interfere with data sharing for competitive advantage - exacerbate these issues (Ali et al., 2024). Financial constraints also play a role, as healthcare organizations may lack the resources to invest in interoperable systems or upgrade existing infrastructure. Such practices create silos, further complicating efforts toward interoperability. Moving forward, achieving meaningful interoperability will require not just technical solutions but also cross-sectoral collaboration, involving technology providers, healthcare providers, and policymakers working towards common standards and incentives for compliance.

4.4 Patient and Family Engagement: Beyond Access to Information

The use of digital tools to improve patient and family engagement offers significant promise but also reveals limitations, especially among older adults, regarding equity in access and digital literacy (Fang et al., 2019; Gordon and Hornbrook, 2018). While digital platforms and wearables can help relatives and loved ones stay informed and involved, the findings reflect the digital divide that often exists among older adults and their families (Frishammar et al., 2023). Many older adults face challenges in adopting new technologies due to a lack of familiarity or comfort, which could inadvertently create disparities in the quality of care received (Bertolazzi et al., 2024). Given this, technology developers and healthcare providers need to move beyond just providing access to “digital tools”. There is a need for user-centered design that considers the specific abilities and limitations of older adults (Frishammar et al., 2023; Mannheim et al., 2023). Moreover, education and support programs need to be tailored to ensure that these technologies are accessible to all, thereby promoting more equitable outcomes in care engagement (Bertolazzi et al., 2024).

4.5 Future Directions

The participant’s optimism about emerging technologies such as monitoring devices, AI-driven predictive analytics and wearable sensors points to the potential for proactive, personalized care. However, it is critical to reflect on the ethical and practical implications of these technologies. Monitoring devices can offer continuous health insights, while predictive analytics can support early interventions, ultimately reducing the need for emergency responses and enhancing overall care outcomes (Kim et al., 2022). However, it is crucial to consider the ethical and practical implications of these technologies. Predictive analytics, for instance, can introduce concerns related to accuracy, bias, and unintended consequences, particularly for vulnerable populations like older adults, where underrepresentation in datasets may lead to disparities in care (Bertolazzi et al., 2024; Junaid et al., 2022). To fully realize the benefits of these innovations, careful reflection on these challenges is needed to ensure equitable, safe, and effective use in home care (Johnson et al., 2020; Mannheim et al., 2023).

Investment in technologies that directly benefit caregivers and older adults must be coupled with rigorous evaluation of both effectiveness and user acceptance (Stoumpos et al., 2023). The importance of ongoing research into the cost-effectiveness and broader impacts of these technologies cannot be overstated (Gentili et al., 2022). Without a clear understanding of the value provided relative to the costs and potential risks, there is a danger of investing in solutions that fail to deliver sustainable improvements in care quality (Junaid et al., 2022).

4.6 Strategic Recommendations

Reflecting critically on these findings, several strategic recommendations emerge for stakeholders, including healthcare providers, policymakers, technology developers, and care managers:

- (1) Training should be part of a broader change management strategy that addresses cultural and emotional barriers to technology adoption. Emphasizing the complementary role of technology in enhancing, rather than replacing, human care could foster a more positive attitude among caregivers. To support this, targeted pilot programs can be introduced to familiarize caregivers with new technologies in a controlled and gradual manner, helping them build confidence.

- (2) Policymakers must consider the development of more adaptive regulatory frameworks that protect patient data while supporting innovation. Regulatory sandboxes could be a practical approach, providing care providers with a controlled environment to experiment with new technologies.
- (3) Achieving true interoperability will require political will, technical standardization, and incentives for collaboration. Stakeholders across the healthcare ecosystem, including vendors, care providers, and regulators, need to work together to establish and enforce national interoperability standards.
- (4) To promote equitable engagement, technology developers must focus on user-friendly and accessible designs for older adults, and care providers should offer tailored education and support to bridge digital literacy gaps. Digital literacy workshops can be organized to familiarize participants with new technologies through practical demonstrations, such as wearable health monitors and patient portals.
- (5) Emerging digital tools, particularly those using AI, must be rigorously tested for cost-effectiveness, ethical implications, and user acceptance to ensure they deliver meaningful benefits without exacerbating existing inequities or introducing new risks.

5 CONCLUSIONS

The integration of digital technologies into home care for older adults in Austria offers transformative opportunities to enhance care quality, efficiency, and independence for aging populations. However, this study highlights several critical barriers, including workforce resistance, financial limitations, regulatory constraints, and the lack of interoperability across healthcare systems. By addressing these challenges through targeted management strategies, regulatory innovation, and cross-sector collaboration, stakeholders can unlock the full potential of digital health technologies in home care. This study contributes to the growing body of knowledge on digital health adoption by providing actionable insights specific to the Austrian context. It underscores the importance of tailored approaches that balance technological innovation with the unique needs of older adults, caregivers, and healthcare providers. For example, practical recommendations, such as implementing regulatory sandboxes, designing user-friendly solutions for older adults, and

fostering financial support for smaller care providers, offer a roadmap for overcoming systemic challenges. Future research should build on these findings to further examine the cost-effectiveness of emerging digital tools in improving care outcomes. Additionally, studies exploring broader policy implications, such as the impact of national interoperability standards or public-private partnerships on care accessibility, would provide valuable insights for scaling solutions. Investigating strategies to ensure equitable access for rural and low-income populations also remains a key area for exploration. To create an ecosystem that supports sustainable and high-quality digital transformation in home care, stakeholders must adopt a collaborative approach. By prioritizing inclusivity, innovation, and evidence-based strategies, Austria has the potential to lead in integrating digital technologies into home care, ultimately improving the quality of life for older adults and creating a model for other healthcare systems to follow.

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CONFLICT OF INTEREST

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REFERENCES

- Adler-Milstein, J., Embi, P.J., Middleton, B., Sarkar, I.N., Smith, J., 2017. Crossing the health IT chasm: considerations and policy recommendations to overcome current challenges and enable value-based care. *J. Am. Med. Inform. Assoc.* 24, 1036–1043. <https://doi.org/10.1093/jamia/ocx017>
- Ali, T.E., Ali, F.I., Dakić, P., Zoltan, A.D., 2024. Trends, prospects, challenges, and security in the healthcare internet of things. *Computing* 107, 28. <https://doi.org/10.1007/s00607-024-01352-4>
- Bertolazzi, A., Quaglia, V., Bongelli, R., 2024. Barriers and facilitators to health technology adoption by older adults with chronic diseases: an integrative systematic review. *BMC Public Health* 24, 506. <https://doi.org/10.1186/s12889-024-18036-5>
- Bharath Perugu, M.B.A., Varun Wadhwa, B.S., Jin Kim, M.E., Jenny Cai, B. (Candidate), Audrey Shin, B. (Candidate), Amar Gupta, M.B.A., 2023. Pragmatic Approaches to Interoperability – Surmounting Barriers to Healthcare Data and Information Across Organizations and Political Boundaries. *Telehealth Med. Today* 8. <https://doi.org/10.30953/thmt.v8.421>
- Bhattarai, P., Phillips, J.L., 2017. The role of digital health technologies in management of pain in older people: An integrative review. *Arch. Gerontol. Geriatr.* 68, 14–24. <https://doi.org/10.1016/j.archger.2016.08.008>
- BMSGPK, 2024. eHealth in Österreich.
- Carlos, J.K., Wilson, K., 2018. Migration among temporary foreign workers: Examining health and access to health care among Filipina live-in caregivers. *Soc. Sci. Med.* 209, 117–124. <https://doi.org/10.1016/j.socscimed.2018.05.045>
- Carvalho, I.A. de, Epping-Jordan, J., Pot, A.M., Kelley, E., Toro, N., Thiyagarajan, J.A., Beard, J.R., 2017. Organizing integrated health-care services to meet older people's needs. *Bull. World Health Organ.* 95, 756. <https://doi.org/10.2471/BLT.16.187617>
- Chu, C., Brual, J., Fang, J., Fleury, C., Stamenova, V., Bhattacharyya, O., Tadrous, M., 2022. The Use of Telemedicine in Older-Adults During the COVID-19 Pandemic: a Weekly Cross-Sectional Analysis in Ontario, Canada. *Can. Geriatr. J.* 25, 380. <https://doi.org/10.5770/cgj.25.610>
- De Santis, K.K., Mergenthal, L., Christianson, L., Busskamp, A., Vonstein, C., Zeeb, H., 2023. Digital Technologies for Health Promotion and Disease Prevention in Older People: Scoping Review. *J. Med. Internet Res.* 25, e43542. <https://doi.org/10.2196/43542>
- DTx Alliance, 2023. DTx Evaluation Toolkit [WWW Document]. Digit. Ther. Alliance. URL <https://dtxalliance.org/understanding-dtx/dtx-evaluation-toolkit/> (accessed 12.21.23).
- Dunn, P., Hazzard, E., 2019. Technology approaches to digital health literacy. *Int. J. Cardiol.* 293, 294–296. <https://doi.org/10.1016/j.ijcard.2019.06.039>
- Fang, M.L., Canham, S.L., Battersby, L., Sixsmith, J., Wada, M., Sixsmith, A., 2019. Exploring Privilege in the Digital Divide: Implications for Theory, Policy, and Practice. *The Gerontologist* 59, e1–e15. <https://doi.org/10.1093/geront/gny037>
- Filippis, R. de, Foyal, A.A., Rocco, V., Guglielmo, R., Sabatino, B., Pietropaoli, A., Boscarino, F., Vallese, A., Ferracuti, S., 2024. The risk perspective of AI in healthcare: GDPR and GELSI framework (Governance, Ethical, Legal and Social Implications) and the new European AI Act. *Ital. J. Psychiatry.* <https://doi.org/10.36180/2421-4469-2024-4>
- Frishammar, J., Essén, A., Bergström, F., Ekman, T., 2023. Digital health platforms for the elderly? Key adoption and usage barriers and ways to address them. *Technol. Forecast. Soc. Change* 189, 122319. <https://doi.org/10.1016/j.techfore.2023.122319>
- Gentili, A., Failla, G., Melnyk, A., Puleo, V., Tanna, G.L.D., Ricciardi, W., Cascini, F., 2022. The cost-effectiveness of digital health interventions: A systematic review of the literature. *Front. Public Health* 10, 787135. <https://doi.org/10.3389/fpubh.2022.787135>
- Goldberg, E.M., Lin, M.P., Burke, L.G., Jiménez, F.N., Davoodi, N.M., Merchant, R.C., 2022. Perspectives on Telehealth for older adults during the COVID-19 pandemic using the quadruple aim: interviews with 48 physicians. *BMC Geriatr.* 22, 188. <https://doi.org/10.1186/s12877-022-02860-8>
- Gordon, N.P., Hornbrook, M.C., 2018. Older adults' readiness to engage with eHealth patient education and self-care resources: a cross-sectional survey. *BMC Health Serv. Res.* 18, 220. <https://doi.org/10.1186/s12913-018-2986-0>
- Haimi, M., Sergienko, R., 2024. Adoption and Use of Telemedicine and Digital Health Services Among Older Adults in Light of the COVID-19 Pandemic: Repeated Cross-Sectional Analysis. *JMIR Aging* 7, e52317. <https://doi.org/10.2196/52317>
- Haleem, A., Javaid, M., Singh, R.P., Suman, R., 2021. Telemedicine for healthcare: Capabilities, features, barriers, and applications. *Sens. Int.* 2, 100117. <https://doi.org/10.1016/j.sintl.2021.100117>
- Hareem, A., Lee, J., Stupans, I., Park, J.S., Wang, K., 2023. Benefits and barriers associated with e-prescribing in community pharmacy – A systematic review. *Explor. Res. Clin. Soc. Pharm.* 12, 100375. <https://doi.org/10.1016/j.rcsop.2023.100375>
- Johnson, K.B., Wei, W.-Q., Weeraratne, D., Frisse, M.E., Misulis, K., Rhee, K., Zhao, J., Snowdon, J.L., 2020. Precision Medicine, AI, and the Future of Personalized Health Care. *Clin. Transl. Sci.* 14, 86. <https://doi.org/10.1111/cts.12884>
- Junaid, S.B., Imam, A.A., Balogun, A.O., Silva, L.C.D., Surakat, Y.A., Kumar, G., Abdulkarim, M., Shuaibu, A.N., Garba, A., Sahalu, Y., Mohammed, A., Mohammed, T.Y., Abdulkadir, B.A., Abba, A.A., Kakumi, N.A.I., Mahamad, S., 2022. Recent Advancements in Emerging Technologies for Healthcare Management Systems: A Survey. *Healthcare* 10, 1940. <https://doi.org/10.3390/healthcare10101940>

- Kim, D., Bian, H., Chang, C.K., Dong, L., Margrett, J., 2022. In-Home Monitoring Technology for Aging in Place: Scoping Review. *Interact. J. Med. Res.* 11, e39005. <https://doi.org/10.2196/39005>
- Mannheim, I., Weiss, D., van Zaaen, Y., Wouters, E.J.M., 2023. An “ultimate partnership”: Older persons’ perspectives on age-stereotypes and intergenerational interaction in co-designing digital technologies. *Arch. Gerontol. Geriatr.* 113, 105050. <https://doi.org/10.1016/j.archger.2023.105050>
- Martin, N., Matt, C., Niebel, C., Blind, K., 2019. How Data Protection Regulation Affects Startup Innovation. *Inf. Syst. Front.* 21, 1307–1324. <https://doi.org/10.1007/s10796-019-09974-2>
- Mumtaz, H., Riaz, M.H., Wajid, H., Saqib, M., Zeeshan, M.H., Khan, S.E., Chauhan, Y.R., Sohail, H., Vohra, L.I., 2023. Current challenges and potential solutions to the use of digital health technologies in evidence generation: a narrative review. *Front. Digit. Health* 5. <https://doi.org/10.3389/fdgh.2023.1203945>
- Oh, S.S., Kim, K.-A., Kim, M., Oh, J., Chu, S.H., Choi, J., 2021. Measurement of Digital Literacy Among Older Adults: Systematic Review. *J. Med. Internet Res.* 23, e26145. <https://doi.org/10.2196/26145>
- Ratnayake, M., LPCMH, ATR, NCC, Lukas, S., Brathwaite, S., Neave, J., Henry, H., BS-c, 2022. Aging in Place: Are We Prepared? *Del. J. Public Health* 8, 28. <https://doi.org/10.32481/djph.2022.08.007>
- Sirur, S., Nurse, J.R.C., Webb, H., 2018. Are We There Yet? Understanding the Challenges Faced in Complying with the General Data Protection Regulation (GDPR), in: *Proceedings of the 2nd International Workshop on Multimedia Privacy and Security, MPS ’18*. Association for Computing Machinery, New York, NY, USA, pp. 88–95. <https://doi.org/10.1145/3267357.3267368>
- Sousa, P., Martinho, R., Parreira, P., Luo, G., 2023. Editorial: mHealth tools for patient empowerment and chronic disease management. *Front. Psychol.* 14, 1206567. <https://doi.org/10.3389/fpsyg.2023.1206567>
- STATISTIK AUSTRIA, 2021. Bevölkerung zu Jahres-/Quartalsanfang [WWW Document]. *Stat. AUSTRIA*. URL <https://www.statistik.at/statistiken/bevoelkerung-und-soziales/bevoelkerung/bevoelkerungsstand/bevoelkerung-zu-jahres-/quartalsanfang> (accessed 10.16.23).
- Stoumpos, A.I., Kitsios, F., Talias, M.A., 2023. Digital Transformation in Healthcare: Technology Acceptance and Its Applications. *Int. J. Environ. Res. Public Health* 20, 3407. <https://doi.org/10.3390/ijerph20043407>
- Torab-Miandoab, A., Samad-Soltani, T., Jodati, A., Rezaei-Hachesu, P., 2023. Interoperability of heterogeneous health information systems: a systematic literature review. *BMC Med. Inform. Decis. Mak.* 23, 18. <https://doi.org/10.1186/s12911-023-02115-5>
- Trukeschitz, B., Österle, A., Schneider, U., 2022. Austria’s Long-Term Care System: Challenges and Policy Responses. *J. Long Term Care* 88–101. <https://doi.org/10.31389/jltc.112>
- Vest, J.R., Gamm, L.D., 2010. Health information exchange: persistent challenges and new strategies. *J. Am. Med. Inform. Assoc. JAMIA* 17, 288–294. <https://doi.org/10.1136/jamia.2010.003673>
- Weik, L., Fehring, L., Mortsiefer, A., Meister, S., 2024. Understanding inherent influencing factors to digital health adoption in general practices through a mixed-methods analysis. *Npj Digit. Med.* 7, 1–16. <https://doi.org/10.1038/s41746-024-01049-0>
- WHO, 2020. Healthy ageing and functional ability [WWW Document]. URL <https://www.who.int/news-room/questions-and-answers/item/healthy-ageing-and-functional-ability> (accessed 1.31.24).
- WHO, 2017. Integrated care for older people: guidelines on community-level interventions to manage declines in intrinsic capacity. World Health Organization, Geneva.
- Wilkinson, G., 2018. General Data Protection Regulation: No silver bullet for small and medium-sized enterprises. *J. Paym. Strategy Syst.*

APPENDIX

Interview Guide

Section 1: Adoption of AI and IoT Technologies

1. General Adoption

- "How open do you think Austrian home care providers are to adopting new technologies like AI and IoT devices?"
- "What do you see as the primary barriers to the adoption of these technologies in home care?"

2. Key Challenges and Solutions

- "What regulatory or operational challenges do providers face when integrating AI or IoT into their services?"
- "What do you think could be done to overcome these barriers and promote wider adoption?"

3. Impact of AI and IoT

- "Can you provide any examples of how AI or IoT has been successfully implemented in Austrian home care? What benefits have you observed?"

Section 2: Impact of Telehealth and Remote Monitoring

1. Telehealth in Home Care

- "How has telehealth been integrated into home care services in Austria? Are

there any examples of its impact on care efficiency or patient outcomes?"

2. **Challenges in Telehealth Adoption**
 - "What challenges have you seen in scaling telehealth solutions, particularly for older adults? Are there any significant barriers, such as resistance from patients or caregivers?"
3. **Effectiveness of Remote Monitoring**
 - "How effective has remote patient monitoring been in improving health outcomes for older adults receiving home care? What are the measurable improvements?"

Section 3: Data Security and Privacy Concerns

1. **Privacy in Digital Home Care**
 - "What are the major concerns regarding data privacy when using digital technologies in home care?"
 - "Have there been any cases or examples of data security breaches, and how were they handled?"
2. **Best Practices**
 - "What best practices do you recommend for ensuring patient data security while still enabling the use of advanced technologies like AI and IoT?"
3. **Regulatory and Ethical Challenges**
 - "How do current data privacy regulations in Austria affect the adoption of digital tools in home care? Are they more of a hindrance or a necessary safeguard?"

Section 4: Interoperability of Digital Tools

1. **Current Integration**
 - "How well do the digital tools used in home care integrate with other healthcare systems, such as hospitals or pharmacies?"
 - "Are there any gaps or interoperability issues that affect the quality of care?"
2. **Improving Interoperability**
 - "What steps do you think need to be taken to improve the interoperability of digital health systems in Austrian home care?"

- "How could better integration impact patient outcomes and care coordination?"

Section 5: Patient and Family Engagement

1. **Engagement through Technology**
 - "How do digital tools enhance the engagement of patients and their families in the care process? Do you find that these tools help families stay more connected and informed?"
2. **Challenges in Engagement**
 - "What challenges do older adults and their families face when using digital tools in home care, and how do you overcome these challenges?"
3. **Impact on Care Satisfaction**
 - "Have you noticed any impact on patient satisfaction or outcomes when families are more engaged through digital means? Can you share any specific examples?"

Section 6: Future Trends and Innovations

1. **Future of Home Care Technologies**
 - "Looking ahead, what emerging technologies do you think have the greatest potential to revolutionize home care for older adults in Austria?"
2. **Technology Investment**
 - "In your opinion, where should home care providers focus their investment in terms of technology to achieve the best outcomes for patients?"
3. **Innovative Solutions**
 - "Are there any innovative projects or technologies that you believe could address current challenges in the Austrian home care system, such as workforce shortages or care accessibility?"