Automation in Caregiving: Technology and Residential Care for the Aged in the United States

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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The aging United States population puts pressure on caregivers and physicians to service increasingly more patients. The proportion of Americans aged 65 and older is expected to grow from 12.5% in 2000 to 20% in 2050, while fewer medical school graduates are specializing in geriatric care (CHWS, 2006). With automation, healthcare providers can give more patients better care and preserve their independence. Conversely, these systems can compromise patient privacy and become excuses to neglect interpersonal care and erode patient-physician relationships. The competing interests, values, and ideas of professional caregivers, corporations, insurers, patients, and advocacies have influenced the use of automation in caregiving. Many patients fear automation enables healthcare workers to ignore their individual needs (Greenhalgh et al, 2013). Physicians are concerned that automation devices, such as remote monitoring tools, provide incomplete data on patient status, leading to misinformed decisions that harm patient trust (Volpato et al, 2021). Trade associations for medical device manufacturers promote relaxing regulations on healthcare automation to apply them to a wider range of patients and increase the profitability of devices. Advocacies for both patients and medical professionals agree that automation can improve healthcare, but that automation alone does not meet patient and caregiver needs (Adler & Mehta, 2014; Keenan, 2022). Medical device manufacturers in the US sometimes produce systems that ignore the interpersonal and medical needs of patients and caregivers, compromising care. Such technologies ignore user needs and experience poor utilization rates and worse patient health outcomes.

Review of Research

Brown-Johnson et al. (2019) defined clinician presence as deliberately managing the environment and connecting with the patient. They contend that stronger clinician presence and patient-physician relationship is more rewarding for medical professionals and reduces burnout. Their research characterizes clinician presence and the potential benefits to the clinician, rather than benefits to patients. In a systematic review of the benefits of interpersonal care, Haverfield et al. (2020) suggest that better physician communication improves health outcomes and patient-provider experience, but not necessarily cost. These studies do not focus directly on the impact of technology on interpersonal caregiving.

In urban planning, desire lines are paths that people naturally choose to walk, rather than following designated paths. Desire lines form when pedestrians repeatedly use an unmarked path where constructed paths are missing or inefficient. Saxena et al. (2020) suggest that 40% of pedestrians have a high tendency to use desire lines, prioritizing shorter walking times. The behavior persisted despite an increased risk and route closure signage along the desire line. This suggests that constructed paths where desire lines form fail to address the needs of time saving pedestrians. Desire lines demonstrate people's motivation to use tools that best fulfill their needs, even when it is more dangerous to do so. This effect may explain why patients neglect life saving healthcare technologies that are difficult to use or fail to meet their needs.

Telehealth visits were popularized during the COVID-19 pandemic to provide healthcare remotely. Kemp et al. (2021) studied healthcare provider experiences at an institution adopting telehealth software during the pandemic. Several issues arose from poor access to equipment and training necessary to properly conduct telehealth visits. Clinicians often used personal devices to meet with patients, endangering patient data privacy and security. Patients and healthcare

providers had difficulties with telehealth software, interrupting visits and reducing healthcare quality. Powell et al. (2017) found that patients with adequate technical resources viewed telehealth visits positively, citing convenience and comfort. Participants largely recognized a need for in-person visits, and viewed telehealth as supplementary. These experiences with telehealth are generally applicable to healthcare automation.

Choi et al. (2020) posit that exposure to ageism leads to less internet usage among aged people. They suggest age discrimination and a negative perception of aging contribute to lower willingness to use the internet and information technologies. Greenhalgh et al. (2013) contend that the non-use of assisted living technologies is due to poor user design or understanding, rather than inherent technical incompetence. They imply that the devices they observed provide an incomplete picture of patient experience, which could contribute to patients' concerns about remote healthcare. These studies provide both alternatives to stereotypes about aged patients' technical ability, and reasons for the low adoption rates of automation devices.

Suler (2004) proposes the online disinhibition effect, which attempts to explain why some people act more negatively online than they would in person. The effect suggests the anonymity and lowered empathy offered by the internet contribute to people acting differently in online interactions. This effect may apply to some forms of automation where patient health is monitored over the internet, and compound risk of elder abuse virtually.

Irresponsible Automation Endangers Clinical Presence and Interpersonal Caregiving

Automation is often advertised to reduce the cost, time, and expertise needed to treat a patient. Strained capacity in the healthcare system puts pressure on healthcare providers and device manufacturers to use automation to increase the patient-caregiver ratio. The US

population of those 65 and older is expected to rise 42.4% by 2034, while increasing the physician shortage (Boyle, 2021). The Medical Device Manufacturers Association (MDMA) lobbies for device manufacturers and those with a financial interest in the industry. The trade association advocates for relaxing regulations on the use and monetization of automation in healthcare, namely telehealth visits and remote monitoring devices (MDMA, 2020). In 2020, they recommended deregulating telehealth visits for psychological evaluations and remote physiologic monitoring. They contend that allowing virtual psychological evaluations prior to receiving non-opioid therapies will increase access to psychological care. Physicians recognize the capacity shortage, but are wary of how automation is used. The physician leader for Mayo Clinic's Advanced Care at Home program comments, "If we can do it safely, and with high quality to provide the best experience, it's how the medical community and the future of health care survive in this country" (Oldenburg, 2022). Wider use of automation may alleviate strain on healthcare capacity, but poor implementation could ignore patient needs.

Automation devices that do not support caregiver-patient interaction fail to address the needs of patients and healthcare providers. Interpersonal care is critical to patient health and both physician and patient satisfaction. According to Haverfield et al. (2020), better interpersonal care and patient-physician relationships reduce burnout and stress while improving patient health and adherence to physician advice. A geriatric physician describes their approach to treatment by saying, "You have to help people identify the outcomes they most want… To be free of pain so he can do carpentry? Feel less fatigue so she can babysit her grandchildren?" (Boyle, 2021). A lack of interpersonal care or an overreliance on automation may ignore a patient's unique priorities and desired outcomes. While some patients enjoy telehealth visits for their convenience, others believe it hinders social connection: "I don't get a sense of the doctor as a

person, [only as a] strict clinician with no real connection with me. But in the office, it's different" (Ladin et al, 2021). While the patient refers to telehealth visits, technologies with less patient-physician interaction likely perform worse with interpersonal care. Given varying patient preferences for telehealth visits, the level of automation in treatment should align with each patient's unique needs and expectations. The overuse of such technology in treatment could make aged patients in particular feel isolated and disconnected from providers. Greenhalgh et al. (2013) contend that many aged patients using assistive medical devices experienced loneliness and a lack of companionship. Interpersonal care is critical to meeting the diverse patient needs, while conscientious use of automation preserves quality of care and patient-caregiver relationships.

Automation that does not account for varied patient populations or socioeconomic factors may widen disparities in healthcare access. Technologies like telehealth and remote monitoring devices promise access to healthcare to patients who have difficulty physically visiting a healthcare provider. These tools, however, rely on technical literacy, equipment, and infrastructure not uniformly accessible to patients. Healthcare providers experience specific obstacles using telehealth with aged patients, as one physician states, "People whose elderly fingers shake too much to use these devices, or who have hearing [or] vision problems…[telehealth] magnifies disparities" (Ladin et al, 2021). Some physicians worry that automation devices built for certain patient groups may be less effective for others. Greenhalgh et al. (2013) describe a patient prone to loss of consciousness was unable to use their pendant alarm before an incident, while others with similar alarms used them without issue. This patient's story exemplifies the problems in using a device that does not consider their patient experience. Telehealth visits and remote monitoring rely on internet infrastructure and equipment not

accessible to all patients. A geriatrician voices their concerns on internet infrastructure to support telehealth and remote monitoring: “I think that piece of, of there being the infrastructure to support the connection is really critical” (Goldberg et al, 2022). The MDMA uses broader access to healthcare as justification for using telehealth for a wider variety of medical visits, referencing that “many patients in rural areas often live far from the nearest provider of psychological screenings, forcing them to travel significant distances” (MDMA, 2020). While automation may improve healthcare access, not considering diverse patient populations and socioeconomic factors may exacerbate existing disparities.

Over reliance on automation in aged patient treatment worsens feelings of social isolation among individuals who rely on face-to-face interactions with healthcare providers. Diminished interactions between patients and caregivers hinders communication and relationship building. This lack of interpersonal connection limits both emotional support for aged patients, as well as their input and adherence to healthcare decisions. The AARP suggests methods for connecting with others physically, rather than through social media, to reduce isolation-related health risks (Flanigan, 2022). Many healthcare providers are concerned about telemonitoring reducing patient interaction. A nurse voices their concern stating, “Maybe they will feel lonelier; it will not be that visit to the patient” (Liljeroos & Arkkukangas, 2023). Some professionals consider loneliness and social isolation to impact aged patient health. Another nurse highlights the connection between emotional wellbeing and physical health saying, “Ideally, we would like to be able to spend more time with them, to spend more time on the emotional aspects, not just on medication and testing” (Dobarrio-Sanz et al, 2021). Advocacies and healthcare professionals recognize the importance of in-person patient interactions to support the emotional wellbeing of patients.

A Focus on Data Neglects Patient and Provider Experiences

Remote monitoring devices may report inaccurate, misleading, or incomplete data to healthcare providers, leading to misinformed decisions and diagnoses. Monitoring devices may be used by patients to track vitals, fitness, and behaviors. They advertise patients convenience and independence in managing their health through accessible statistics and feedback. Ideally, they enable patients to get more, informed advice from physicians without requiring an in-person visit. The AARP interest group is optimistic about remote monitoring devices for these reasons, but mentions the need for a human element (Oldenburg, 2022). A trade association for medical device manufacturers, the MDMA, advocates for wider use and monetization of remote monitoring devices (MDMA, 2020). Physicians, however, are pressured to address patient concerns based on data from devices they may know little about. A general practitioner comments on wearable monitoring devices, "When worried patients come [to the consultation] with such instruments, what do we do? We have to give them an answer" (Volpato et al, 2021). Remote monitoring data may also differ from data reported by other devices, misleading physician decisions. Incomplete data and misinformed decision making undermine trust between physicians and patients. Some patients share this concern, as one states, "Your machine may not be as good as the ones at the doctor's office, and you may be getting a wrong result" (Ladin et al, 2021). Broader use of monitoring devices without improving physician training and understanding of devices stresses trust in the patient-physician relationship.

Remote monitoring does not replace interpersonal care since it provides an incomplete picture of patient health. While good devices may yield healthcare providers accurate data, they often fall short in conveying subjective patient experiences. This leaves patients feeling unheard

and reduces healthcare providers to data analysts. A patient expressed her concerns with using remote monitoring devices, “I'm scared of them [doctors] closing a drawer and forgetting me” (Greenhalgh et al, 2013). Healthcare providers are wary their jobs will focus on data analysis, rather than treating patients. A cardiologist states, “The problem is the more and more we get inundated with data, there’s only so much time, and I worry sometimes about less face-to-face time with a patient as we’re looking at the data,” emphasizing interpersonal care as integral to their work (Skiba, 2019). The National Alliance for Caregiving (NAC), an advocacy group for US caregivers, suggests too much data can hinder caregiving and shifts focus away from the patient (Adler & Mehta, 2014). They cite difficulty in determining what data is useful to reduce strain on caregivers. Remote health monitoring services, such as Smart Clinix, track patient vitals and notify their physicians as needed (Smart Clinix, n.d.). Their system promises more efficient and higher quality healthcare. While this reduces burden on physicians, it hinders patient’s ability to voice concerns to their physician, and places focus on patient data for evaluating well-being. Remote health monitoring which supports patient-physician communication allows patient independence without diminishing aspects of interpersonal care.

Easily accessible health data allows patients to become overly concerned with their physical health. Patients with a chronic heart problem and consistent access to ECG data, for example, may conflate data with their well-being. A general practitioner comments on wearable devices, “People may end up spending more time preoccupying about their health instead of living” (Volpato et al, 2021). Collier (2019), on behalf of the AARP, promotes their positive experience using a monitoring device for weight and blood pressure management. They frame the constant access to health data as a motivator towards positive health outcomes. Easy access to health data enables patients to be proactive about their wellbeing, but also risks stress and

anxiety when data is read improperly. The Apple Watch, a popular choice for remote health monitoring, notifies users when it detects abnormal heart rates or rhythms (Apple, n.d.). Apple comments on their ECG app, “This real-world data can enable you to make more informed and timely decisions regarding further evaluation and care.” While more access to data grants patients agency and a sense of control over their health, overemphasis on metrics may create more stress and prompt self-diagnoses. Similarly, focusing solely on quantitative data detracts from other strategies and habits that help manage patient health and well-being.

Automation puts Patient Privacy and Safety at Risk

Incorporating automation and remote monitoring devices into aged patient healthcare raises data privacy concerns. The increasing use of these systems in the treatment process involve the collection, storage, and transmission of sensitive patient health data. Aged patients in particular face challenges with digital literacy and awareness concerning the use of their health data. Most patients are unaware of where their data is stored and how it is used, one states, “If I’m in an appointment with my doctor, I always see him typing, so that must be going somewhere” (Wetzels et al, 2018). Startup-driven innovation in healthcare automation may also subject patient data to lower standards of security and data breaches. The AARP interest group for aged Americans emphasizes ethical data usage in caregiving with respect to privacy and security (Keenan, 2022). Allowing physicians to analyze patient data and interact with patients outside of a traditional care setting exposes data to unsecured wifi and personal devices. One physician praises the flexibility of telehealth visits during the COVID-19 pandemic, stating they “liked the ability to conduct visit[s] anywhere quiet–at home office or in clinic” (Gold et al, 2021). Another physician comments on the informality of telehealth visits, where the patient

joined the video call while walking down a busy street (Ladin et al, 2021). The HIPAA outlines regulations for the collection and storage of health data in the US. HIPAA waivers for telemedicine and remote health monitoring during the COVID-19 pandemic were made permanent for some uses. A geriatric specialist supports adapting current regulations, and states, "I think the average person doesn't really care about HIPAA" (Goldburg et al, 2022). The MDMA (2020) recommends continuing the waivers granted to telehealth and remote health monitoring during the public health crisis (PHE). Their proposal supports continuing changes to the billing process in remote healthcare, as they "... allow beneficiaries to receive uninterrupted care during these difficult times and will facilitate access to care after the PHE." Maintaining the balance between adapting regulations to new technologies and upholding healthcare data privacy is critical in the treatment of aged patients. While some physicians and patients value the conveniences of telehealth and remote monitoring devices, others are concerned about privacy. Expanding use of automation and a lack of patient understanding about their data endangers patient privacy and security.

Increased automation in aged patient treatment exposes them to new avenues for abuse and mistreatment. As healthcare systems integrate automation and remote monitoring into geriatric care, they risk enabling the exploitation and mistreatment of a vulnerable population. Elder abuse, including financial exploitation, neglect, and emotional abuse, may arise in automated systems where sensitive patient data is easily accessible. Most victims of elder abuse are reluctant to report their concerns out of embarrassment or fear of consequences. Some physicians have difficulty detecting signs of elder abuse and determining if they should investigate further. One physician cites the differences between investigating elder abuse and their other responsibilities, "The trouble is, you just can't say, 'I'm going to order an EKG and a

CBC, and I'm going to call a social worker because I think you're being abused'" (Schmeidel et al, 2012). A reliance on telehealth exacerbates these issues, as some physicians are concerned about losing physical examinations because "not being able to [physically] examine the patient is a problem… I'm always worried I'm missing something" (Ladin et al, 2021). While physical signs of abuse are harder to identify remotely, difficulties with telehealth hinder patient-physician rapport and make victims less likely to disclose concerns of abuse. Remote monitoring and automation devices with less patient-physician interaction further compound this issue. Elder abuse is also a low visibility issue. A California prosecutor focusing on elder abuse cases suggests, "Elder abuse needs a national discussion and a national agenda, like ones we've had for child abuse and domestic violence for so long" (Ramnarace, 2010). Suler's (2004) proposed online disinhibition effect suggests the anonymity and abstracted perception of patients allowed by remote health monitoring could increase the risk of elder abuse by healthcare providers and caregivers. By distancing patients and physicians, reliance on automation in aged patient care may exacerbate current problems in identifying and preventing elder abuse.

Conclusion

Attempts to alleviate an over capacity healthcare system and shortage of medical professionals through automation poses risks to aged patients. Many patients prioritize interpersonal caregiving, independence, social interaction, and consistent access to healthcare, needs which are not met by current technologies. Physicians and healthcare providers lose the benefits of in-person examinations and strong patient-provider relationships, presenting health and safety risks to patients. Automation has been developed to increase the number of patients a

professional can treat, rather than meet the goals of aged patients and healthcare providers. Crises like the COVID-19 pandemic, the increasing proportion of aged americans, and the lack of geriatric care specialists accelerate the use of automation in aged patient treatment while shifting focus away from unique patient needs and quality of care. Device manufacturers, remote monitoring companies, and trade associations have advertised automation to replace, rather than support, interpersonal caregiving, attention to subjective patient experiences, and patient privacy. The competing interests of participants yields a trend in which healthcare automation is often used to streamline processes and increase efficiency at the cost of patient-centered care and individual patient health goals.

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