LINK MEDICAL JOURNAL
of Health and Community Research | LMJHCR
Volume 4, Issue 1 | June 2026 | ISSN 3007-3448

Indexed in DOAJ | CC Bq4jc7c36Y 4.0
DOI: 10.61919/jnanpe50

Original Article

Distributed Digital Care Work in Remote Patient Monitoring: A Qualitative Study of Older Adults with Multimorbidity, Family Caregivers and Clinicians in Indonesia

Liu Zhanyuan[1], Linda Chiuman[1], Muhammad Faridz Syahrian[1]

[1] Universitas Prima Indonesia, Indonesia

***Corresponding author: Linda Chiuman, lindachiuman@unprimdn.ac.id**

"Cite this Article" | **Received**: 01 June 2026; **Accepted**: 23 June 2026; **Published**: 30 June 2026.

ABSTRACT

Background: Remote patient monitoring is increasingly incorporated into chronic-disease care, but its usefulness for older adults with multimorbidity depends on the practical, cognitive, relational, and professional work required to generate, interpret, and respond to remotely collected information. How this work is distributed among patients, family caregivers, and clinicians remains insufficiently understood. Objective: To explore how older adults with multimorbidity, unpaid family caregivers, and clinicians experienced, organised, and negotiated digital care work associated with remote patient monitoring in Medan, Indonesia. Methods: A qualitative descriptive study with an interpretive orientation was conducted between January and May 2026. Twelve participants—six older adults, three family caregivers, and three clinicians—were purposively recruited using maximum-variation sampling. Semi-structured individual interviews were analysed using reflexive thematic analysis, with Normalisation Process Theory and burden of treatment theory used as sensitising perspectives after initial coding. Results: Six interrelated themes were developed: reassurance through data but not certainty; monitoring as an additional treatment regimen; caregivers as digital intermediaries and moral safety nets; clinical visibility constrained by workflow and fragmented responsibility; relational negotiation of autonomy, surveillance, and trust; and the need for adaptive, human-supported care. Monitoring was perceived as valuable when data were interpretable and connected to credible clinical responses, whereas rigid routines, hidden caregiver labour, technological problems, and unclear responsibility increased burden. Conclusion: Remote monitoring redistributed rather than eliminated care work. Person-centred implementation requires adaptable monitoring demands, negotiated caregiver involvement, clear clinical accountability, continuing human support, and accessible non-digital alternatives. Keywords: multimorbidity; older adults; remote patient monitoring; digital care work; family caregivers; qualitative research

EDITORIAL INFORMATION

Author Contributions: Concept: LZ; Design: LZ, LC; Data Collection: MFS; Analysis: LZ, LC; Drafting: LZ, MFS; Supervision: LC.
Ethical Approval: Universitas Prima Indonesia
Informed Consent: Written informed consent was obtained from all participants
Conflict of Interest: The authors declare no conflict of interest; **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

INTRODUCTION

Multimorbidity has become a central challenge in ageing populations because older adults commonly live with several chronic conditions that must be managed simultaneously rather than as isolated diseases. A systematic review and meta-analysis estimated that multimorbidity affects more than one-third of adults living in community settings globally, with prevalence rising substantially with age (1). Indonesian evidence similarly demonstrates a considerable burden of multimorbidity, occurring alongside rapid population ageing and growing demands on chronic-disease services (2,3). For older adults, this burden extends beyond the number of diagnoses to the combined demands of medicines, symptoms, appointments, dietary recommendations, mobility limitations, financial pressures, and coordination across fragmented services.

Remote patient monitoring has been proposed as one approach to supporting chronic-disease management by allowing physiological measurements and symptoms to be recorded outside conventional clinical encounters. Its implementation, however, is more complex than transmitting blood pressure,

glucose, oxygen saturation, weight, or symptom data. Multimorbidity itself complicates care because conventional disease-specific approaches may inadequately account for interacting conditions, functional limitations, treatment workload, and competing priorities, while interventions for multimorbidity in primary and community care have produced heterogeneous outcomes (4,5). Remote monitoring should therefore be understood as a sociotechnical care arrangement involving devices, connectivity, patient and caregiver capability, clinical interpretation, workflow integration, escalation pathways, and responsibility for responding to incoming information. Reviews of remote patient monitoring indicate that its effectiveness depends not simply on acquiring data but on whether services can convert those data into timely, meaningful, and actionable care (6,7).

Qualitative evidence further suggests that self-management among older people with multimorbidity involves continuous prioritisation and adaptation rather than straightforward compliance with disease-specific recommendations. Individuals frequently reconcile professional advice with symptoms, fatigue, mobility, participation, and the practical demands of everyday life (8). Studies of digital chronic-disease management similarly show that technologically successful data capture does not necessarily translate into a useful or acceptable care experience, particularly when measurements are difficult to interpret or are disconnected from responsive professional support (9). Digital capability is also heterogeneous among older adults and is influenced by literacy, previous technological experience, physical capability, resources, interface design, and available assistance rather than chronological age alone (10). Remote monitoring can therefore generate new forms of practical and cognitive work even while reducing some requirements for face-to-face attendance.

Family involvement adds another important dimension. Caregivers of older adults with complex chronic conditions commonly undertake substantial practical, emotional, and coordination work, and digital monitoring may expand this role to include operating applications, troubleshooting equipment, interpreting readings, repeating measurements, and deciding when professional help is required (11). At the same time, shared access to health information can create tensions between support, privacy, surveillance, and autonomy, particularly when access arrangements evolve after initial enrolment (12). On the clinical side, remote data also generate work: incoming information must be reviewed, contextualised, prioritised, documented, and connected to someone with authority to respond. Stand-alone dashboards, excessive alerts, unclear review schedules, and fragmented accountability can undermine the practical value of technically available information (13).

These interacting forms of work make it necessary to examine remote monitoring as a relational and organisational practice rather than solely as a technological intervention. Normalisation Process Theory provides a framework for considering how participants understand, engage with, operationalise, and appraise new practices within everyday care (14), whereas burden of treatment theory focuses attention on the relationship between healthcare workload and the capacity available to individuals and families to manage that workload (15). Used together as sensitising perspectives, these approaches help distinguish technological usability from the broader distribution of responsibility, effort, uncertainty, and support across patients, caregivers, and professionals. Accordingly, this qualitative study explored how older adults with multimorbidity, unpaid family caregivers, and clinicians in Medan, Indonesia experienced, organised, and negotiated the digital care work associated with remote patient monitoring. Specifically, it examined how monitoring shaped perceptions of reassurance and uncertainty, treatment workload, caregiver responsibility, clinical visibility and accountability, autonomy and trust, and the conditions participants considered necessary for sustainable and person-centred monitoring.

MATERIALS AND METHODS

A qualitative descriptive study with an interpretive orientation was conducted in outpatient and community-care networks associated with universities in Medan, North Sumatra, Indonesia, between January and May 2026. The study examined everyday experiences of remote patient monitoring among older adults living with multimorbidity, unpaid family caregivers who supported monitoring, and clinicians involved in reviewing remote information or responding to patients. Monitoring arrangements included

home measurement of blood pressure, blood glucose, oxygen saturation, weight, and symptoms using remote-monitoring devices and mobile telephones linked to clinician review.

Purposive maximum-variation sampling was used to recruit 12 participants comprising six older adults, three unpaid family caregivers, and three clinicians. Older adults were eligible if they were aged 60 years or older, had at least two diagnosed chronic conditions, and had used remote patient monitoring on at least two occasions during the preceding six months. Caregivers were unpaid family members who regularly assisted with monitoring, communication, or health-related decision-making. Clinicians were eligible when they had direct experience reviewing remotely generated health data, communicating with monitored patients, or escalating care in response to monitoring information. The clinician sample comprised a physician, a monitoring nurse, and a clinical pharmacist. Sampling sought variation in age, sex, living arrangements, combinations of chronic conditions, digital confidence, monitoring intensity, and caregiver involvement.

Data were generated through individual semi-structured interviews. Interview discussions addressed a typical monitoring day; helpful and difficult experiences; missed or abnormal readings; responsibility for monitoring and response; communication with clinicians and family members; privacy; and suggested improvements to remote-monitoring services. Incident-based prompts were used to encourage participants to describe what occurred before, during, and after specific monitoring events rather than providing only general opinions. Interviews with older adults and caregivers lasted approximately 45–60 minutes, while clinician interviews lasted approximately 40–55 minutes. Participants selected an in-person, telephone, or video interview format. Field notes and post-interview memos were used to record contextual observations, emotional emphasis, and emerging comparisons between participant accounts.

Interviews were audio-recorded, transcribed verbatim, checked against the recordings, and de-identified using participant codes: OA for older adults, FC for family caregivers, and CL for clinicians. The analysis followed reflexive thematic analysis, involving repeated familiarisation with the data, preparation of case summaries, coding of actions, meanings, contextual conditions and emotional dimensions, comparison within and across participant groups, development of candidate themes, and iterative review of themes against the complete dataset. Reflexive thematic analysis was selected because the aim was to develop interpretive patterns of shared meaning rather than to treat coding as a measurement exercise requiring mechanical agreement between coders (16,17). Normalisation Process Theory and burden of treatment theory were introduced after initial coding as sensitising resources for interpretation rather than as predetermined coding frameworks.

Trustworthiness was supported through maintenance of an audit trail, attention to negative or contrasting cases, comparison across older-adult, caregiver and clinician accounts, peer debriefing, and reflexive consideration of assumptions concerning ageing, technological capability, family support, and professional responsibility. These strategies were used to strengthen the credibility and interpretive transparency of theme development rather than to imply that qualitative interpretations were independent of researcher judgement (18). Ethical approval was obtained from Universitas Prima Indonesia. Participants received information about the study and provided written or recorded consent. They were informed that participation was voluntary and that quotations would be anonymised. Recruitment procedures were intended to minimise pressure on older adults from caregivers or clinicians. Personal health, family, and workplace information was limited to information required for the analysis and was stored securely.

RESULTS

The study included 12 participants: six older adults aged 64–79 years who were living with two to four chronic conditions, three unpaid family caregivers, and three clinicians. The clinician participants were a physician, a monitoring nurse, and a clinical pharmacist. Monitoring experiences included blood-pressure measurement, blood-glucose monitoring, oxygen-saturation monitoring, weight measurement, and symptom reporting. Participants described a broad range of digital confidence, and confidence was not consistently related to chronological age. Analysis generated six interrelated themes: (1) reassurance

through data, but not certainty; (2) monitoring as an additional treatment regimen; (3) caregivers as digital intermediaries and moral safety nets; (4) clinical visibility limited by workflow and fragmented responsibility; (5) relational negotiation of autonomy, surveillance and trust; and (6) the need for adaptive, human-supported care.

Table 1. Thematic matrix across participant groups

Theme	Older-adult accounts	Family-caregiver accounts	Clinician accounts	Main contrast or analytic pattern
Reassurance through data, but not certainty	Readings reduced uncertainty when interpreted alongside symptoms and personal baselines	Stable readings could reduce vigilance but did not replace concern about the person's condition	Numbers required interpretation in relation to symptoms, treatment and previous patterns	Data were reassuring only when linked to meaningful interpretation and credible response
Monitoring as an additional treatment regimen	Schedules, reminders, physical difficulty and multiple monitoring tasks created workload	Families absorbed some technical, logistical and financial tasks	Direct clinician evidence was less prominent within this theme	Apparent convenience could conceal additional treatment work at home
Caregivers as digital intermediaries and moral safety nets	Assistance was valued when negotiated but could become intrusive	Caregivers managed applications, connectivity, repeated measurements, vigilance and escalation	Clinical pathways indirectly relied on caregiver interpretation and communication	Patient independence could depend on substantial hidden family labour
Clinical visibility limited by workflow and fragmented responsibility	Participants expected transmitted information to reach someone capable of responding	Caregivers depended on a clear pathway when readings caused concern	Stand-alone dashboards, uncertain review schedules and divided authority limited actionability	Technical data availability did not necessarily constitute operational clinical visibility
Relational negotiation of autonomy, surveillance and trust	Participants wanted control over who saw information and how assistance was provided	Caregiver access could function as support or surveillance	Clinicians recognised the risk that patients might misunderstand the extent of monitoring	Trust depended on negotiated access, realistic response expectations and retained patient control
Adaptive, human-supported care	Monitoring needs changed with health status and personal capability	Caregiver availability and later technical problems influenced sustainability	Clinicians valued information that was sufficiently consistent and actionable	Sustainable monitoring required flexibility, technical support and alternatives to exclusively digital pathways

Reassurance through data, but not certainty

Participants described remote measurements as useful when they helped interpret otherwise ambiguous symptoms, particularly when several chronic conditions could plausibly explain dizziness, fatigue, breathlessness, or other changes in wellbeing. Measurements could therefore reduce uncertainty, but participants consistently distinguished numerical reassurance from a complete understanding of their health. OA5 captured this distinction directly: “The machine is not aware of when my body is wrong.” Participants' accounts indicated that readings gained meaning when considered alongside symptoms, personal baselines, medication changes, and access to an appropriate professional response.

This distinction was particularly important when stable biometric readings coexisted with poor subjective wellbeing or when isolated abnormal measurements could have resulted from timing, technique, or other contextual factors. A contrasting account was provided by OA4, who did not want routine professional contact after every measurement and preferred professional involvement when a previously agreed threshold was crossed. The pattern therefore did not indicate a universal desire for more contact; rather, participants valued predictable and individualised interpretation and response.

Monitoring as an additional treatment regimen

Remote monitoring was also experienced as an additional component of treatment rather than a passive technological service. Participants described having to remember measurement schedules, position equipment correctly, prepare devices, respond to reminders, record symptoms, and determine whether a reading appeared plausible. OA3 described the moral pressure associated with missing a scheduled measurement: “When I miss the time, I think I have failed the entire day.”

The burden of monitoring varied with participants' physical and technological capacity. Physical weakness, pain, and difficulties applying equipment could make apparently simple tasks considerably harder, while repeated reminders could intensify frustration when non-completion resulted from incapacity rather than disengagement. Participants also referred to the cumulative cost of glucose strips, batteries, and mobile data. These accounts suggested that the burden of remote monitoring depended less on the nominal

duration of an individual measurement than on how the monitoring routine interacted with existing treatment demands, symptoms, household resources, and daily life.

Caregivers as digital intermediaries and moral safety nets

Family caregivers performed substantial digital and clinical-support work. Their activities included managing passwords, installing or updating applications, arranging connectivity, entering symptom information, repeating questionable measurements, monitoring for deterioration, and deciding when to contact clinicians. FC2 described the extent to which nominally patient-operated monitoring could depend on another person: “My mother is listed as the user, but the password, the updates and the messages are mine.”

Caregiver involvement extended beyond technical facilitation. Following abnormal readings, caregivers sometimes repeated measurements, considered symptoms and medication use, and initiated contact with health professionals. At the same time, older adults differentiated desired assistance from excessive oversight. Help was more acceptable when its scope had been negotiated, whereas continuous checking could be experienced as surveillance. Caregiver capacity was itself variable because employment, physical limitations, fatigue, and competing responsibilities affected whether family members could provide sustained support. The theme therefore indicated that apparently independent remote monitoring could rely on substantial unpaid and potentially unstable family labour.

Clinical visibility limited by workflow and fragmented responsibility

Clinicians valued longitudinal information but distinguished the technical availability of remote data from its practical visibility within clinical workflow. Data could be present on a monitoring platform without being reviewed promptly, transferred into the clinical record, or assigned to a professional with clear responsibility for acting on them. CL2 summarised this problem: “Those data can only be seen in theory.”

Incoming information also required contextual assessment. Clinicians described the need to consider measurement technique, meal timing, equipment or strip problems, medication changes, and symptoms before interpreting alerts. Responsibility was distributed across nurses, physicians, pharmacists, and external professionals, creating situations in which the person viewing an alert did not necessarily have the authority or information required to respond. Participants consequently described clinical visibility as an organisational achievement rather than an automatic consequence of digital transmission.

Relational negotiation of autonomy, surveillance and trust

Older adults did not equate autonomy with performing every monitoring activity without assistance. Instead, they emphasised control over how help was provided, who could access their information, and what happened after information was transmitted. OA3 expressed this concern directly: “The device is in my house, but at times knowledge pertains to everybody before it can pertain to me.”

Trust increased when participants believed that transmitted information reached a professional and generated an appropriate response. Conversely, willingness to provide symptom information could decline when participants received no acknowledgement or were uncertain whether their data had been reviewed. Privacy concerns were frequently embedded within household relationships because caregivers sometimes installed applications on their own telephones or obtained extensive access to monitoring information. Clinicians also recognised that participants could interpret remote monitoring as continuous professional surveillance, potentially creating unrealistic expectations about immediate review. Autonomy and trust were therefore negotiated through practical arrangements concerning access, assistance, expected response times, and retained patient control.

Adaptive, human-supported care

Participants did not describe either exclusively face-to-face care or fully automated monitoring as an ideal solution. Instead, they emphasised adaptation. Monitoring intensity could become more useful when symptoms or medication regimens changed and less valuable when repeated stable measurements did not alter management. The sustainability of monitoring was also influenced by later technological

problems and changes in caregiver availability. FC3 described the difference between supported initiation and subsequent difficulty: "The issue arises after 2 weeks, when the machine fails to act as expected."

Participants' suggestions included lower-data systems, access to loaned devices, telephone reporting, and community-based assistance. These accounts highlighted different forms of value across stakeholder groups: older adults emphasised integration with everyday life and avoidance of unnecessary travel, caregivers emphasised reassurance without an expectation of continuous vigilance, and clinicians emphasised sufficiently reliable and actionable information. Across these perspectives, sustainable remote monitoring was characterised not by uninterrupted data transmission alone but by adaptable monitoring demands, continuing human support, clear pathways for response, and viable non-digital alternatives.

Table 2. Representative quotations supporting the six themes

Theme	Participant	Representative quotation
Reassurance through data, but not certainty	OA5, older adult	"The machine is not aware of when my body is wrong."
Monitoring as an additional treatment regimen	OA3, older adult	"When I miss the time, I think I have failed the entire day."
Caregivers as digital intermediaries and moral safety nets	FC2, family caregiver	"My mother is listed as the user, but the password, the updates and the messages are mine."
Clinical visibility limited by workflow and fragmented responsibility	CL2, clinician	"Those data can only be seen in theory."
Relational negotiation of autonomy, surveillance and trust	OA3, older adult	"The device is in my house, but at times knowledge pertains to everybody before it can pertain to me."
Adaptive, human-supported care	FC3, family caregiver	"The issue arises after 2 weeks, when the machine fails to act as expected."

DISCUSSION

This qualitative study shows that the perceived value of remote patient monitoring for older adults with multimorbidity was produced not by data transmission alone but through a sequence of measurement, interpretation, communication, and response involving patients, family caregivers, and clinicians. Participants described monitoring as reassuring when measurements could be interpreted alongside symptoms and personal baselines and when they believed that clinically meaningful information would receive an appropriate professional response. This interpretation is consistent with qualitative evidence showing that patients' experiences of remote monitoring depend substantially on understandable feedback and connection to clinical care rather than on the mere availability of physiological data (19). It also supports broader evidence that remote patient monitoring functions as a sociotechnical service whose effectiveness depends on the infrastructure surrounding data collection, including integration, interpretation, workflow, and timely action (6,7). The findings therefore suggest that clinical value arises through the relationship between data and responsive care rather than through measurement frequency alone.

Monitoring also created additional treatment work. Participants described remembering schedules, responding to reminders, operating equipment, interpreting readings, managing symptoms, and absorbing financial or connectivity costs while simultaneously managing multiple chronic conditions. These accounts extend the concept of burden of treatment, in which the workload imposed by healthcare must be considered in relation to the capacity individuals have available to perform it (15). Older adults with multimorbidity already adapt professional recommendations to competing symptoms, functional limitations, treatment demands, and everyday priorities (8). In this context, a missed reading should not automatically be interpreted as disengagement or poor adherence because non-completion may instead reflect pain, weakness, technological failure, fluctuating capacity, or competing care demands. Remote-monitoring services may therefore be more person-centred when monitoring intensity and expectations can be adapted to changing health status and individual capacity rather than treating uniform completion as the principal indicator of successful participation.

Family caregivers were central to the functioning of remote monitoring, but much of their work remained institutionally invisible. Participants described caregivers managing applications and passwords,

maintaining connectivity, repeating measurements, observing symptoms, interpreting risk, and initiating communication with clinicians. Previous qualitative research has similarly demonstrated that self-care among older adults with multiple chronic conditions is frequently co-produced within patient-caregiver relationships rather than performed by patients independently (20). Caregivers of older adults also report substantial informational, emotional, and practical support needs when managing complex care at home (11,21). The present findings suggest that digital monitoring can intensify this co-production by transferring technical and surveillance responsibilities into the household. Services should therefore avoid interpreting successful transmission as evidence of patient independence without considering who is actually performing the monitoring work. Where caregivers are involved, their role, access to information, expectations, and limits of responsibility should be explicitly negotiated rather than assumed.

The distinction between technical data availability and operational clinical visibility was another important finding. Clinicians described circumstances in which information could exist on a remote-monitoring platform but remain clinically ineffective because review schedules were unclear, dashboards were disconnected from routine records, responsibility was distributed across professionals, or the individual viewing an alert lacked authority to act. Implementation experience with nurse-led remote-monitoring programmes similarly indicates that workflow redesign, role definition, communication processes, and integration into routine care are essential components of implementation rather than peripheral administrative concerns (22). Research on alert optimisation also demonstrates that excessive or poorly targeted alerts can generate substantial clinical workload and require carefully designed prioritisation processes (13). These findings support explicit service-level arrangements specifying who reviews incoming information, the expected review window, escalation procedures, documentation responsibilities, and the professional authority associated with different levels of concern.

Autonomy and trust were negotiated relationally rather than defined simply by whether an older adult could operate a device independently. Participants accepted assistance when it was perceived as supportive and controllable but expressed discomfort when family access or continuous monitoring became intrusive. Similar qualitative evidence from home-monitoring research indicates that privacy and acceptability depend on transparency, proportionality, and the ability of individuals to negotiate how monitoring occurs within their domestic environment (12). Participants in the present study also associated trust with knowing that transmitted information reached a person rather than an unobserved digital repository. Accordingly, informed consent for remote monitoring should be treated as an ongoing process that includes discussion of who can access data, how caregiver involvement will operate, when information is reviewed, what response can reasonably be expected, and when conventional urgent-care pathways remain necessary.

The findings also challenge assumptions that chronological age alone determines digital capability. Participants displayed different levels of digital confidence that were not uniformly associated with age, while successful monitoring depended on connectivity, physical capacity, household support, technical assistance, and the practical relevance of the monitoring task. A meta-ethnography of communicative e-health adoption among older adults similarly identified usability, perceived value, support, trust, and personal context as important determinants of engagement (23). Evidence concerning the digital divide among older people further shows that access to telehealth can be constrained by technology, affordability, literacy, disability, connectivity, and social resources (24). Equity should therefore be assessed not only at enrolment but throughout participation. Offering telephone reporting, community assistance, device support, or equivalent non-digital pathways may help prevent remote monitoring from disproportionately benefiting individuals who already possess greater technological and social resources.

Taken together, the findings support an adaptive rather than device-centred model of remote monitoring. Normalisation Process Theory emphasises that implementation depends on whether participants can make sense of an intervention, engage with its work, incorporate it into routine practice, and appraise its value over time (14). Goal-oriented approaches to multimorbidity similarly prioritise outcomes that matter to the individual rather than maximising completion of disease-specific tasks (25). Within this study, monitoring appeared most acceptable when its purpose was understandable, its demands were

proportionate, caregiver involvement was negotiated, clinical responsibility was visible, and human support remained available when technology or circumstances changed. These findings do not demonstrate that such adaptations improve clinical outcomes; rather, participants' accounts suggest conditions that may strengthen acceptability, sustainability, and integration into everyday care and should therefore be evaluated prospectively in implementation and effectiveness research.

Several limitations should be considered when interpreting these findings. The study involved a small purposive sample from an urban, university-associated care context in Medan and was designed for interpretive depth and cross-role comparison rather than statistical generalisation. Although inclusion of older adults, caregivers, and clinicians enabled examination of distributed responsibilities, only three caregivers and three clinicians were included, limiting the range of perspectives represented within each stakeholder group. Different conditions and monitoring arrangements increased the relevance of the analysis to multimorbidity but reduced the ability to attribute experiences to particular technologies or disease-specific programmes. Experiences were reconstructed through interviews rather than direct observation of monitoring practices, introducing the possibility of recall and social-desirability influences. Theoretical sensitisation through Normalisation Process Theory and burden of treatment theory may also have directed analytic attention towards implementation work and treatment burden, despite the use of initial open coding (14,15). In addition, the current report does not establish whether individuals who declined participation or experienced the greatest digital exclusion differed systematically from those interviewed. Future longitudinal and ethnographic research should examine monitoring practices over time, particularly among individuals with greater frailty, limited digital literacy, cognitive difficulties, unstable connectivity, or little family support.

CONCLUSION

Remote patient monitoring was experienced not as a replacement for care work but as a redistribution of measurement, interpretation, vigilance, communication, and responsibility across older adults with multimorbidity, family caregivers, and clinicians. Participants perceived monitoring as most useful when measurements were relevant to their symptoms and goals, professional response pathways were credible, caregiver involvement was negotiated, and technical or human support remained available. Conversely, rigid monitoring schedules, hidden reliance on unpaid family labour, uncertain clinical responsibility, fragmented workflows, and unclear expectations about data review could increase burden and weaken trust. These findings support designing remote monitoring as an adaptive care service rather than a device-centred intervention, with monitoring intensity matched to clinical and personal need, explicit clinical responsibility, transparent response expectations, negotiated caregiver access, continuing technical support, and equivalent non-digital options. These findings describe perceived mechanisms and implementation conditions within this qualitative sample and should not be interpreted as evidence of population-level effectiveness or causal improvement in clinical outcomes.

REFERENCES

1. Chowdhury SR, Das DC, Sunna TC, Beyene J, Hossain A. Global and regional prevalence of multimorbidity in the adult population in community settings: a systematic review and meta-analysis. eClinicalMedicine. 2023;57:101860. doi:10.1016/j.eclinm.2023.101860.

2. Griselda M, Alfian SD, Wicaksono IA, Wawruch M, Abdulah R. Findings from the Indonesian family life survey on patterns and factors associated with multimorbidity. Sci Rep. 2023;13(1):18607. doi:10.1038/s41598-023-42603-2.

3. Basrowi RW, Rahayu EM, Khoe LC, Wasito E, Sundjaya T. The road to healthy ageing: what has Indonesia achieved so far? Nutrients. 2021;13(10):3441. doi:10.3390/nu13103441.

4. Beridze G, Abbadi A, Ars J, et al. Patterns of multimorbidity in primary care electronic health records: a systematic review. J Multimorb Comorb. 2024;14:26335565231223350. doi:10.1177/26335565231223350.

5. Smith SM, Wallace E, O'Dowd T, Fortin M. Interventions for improving outcomes in patients with multimorbidity in primary care and community settings. Cochrane Database Syst Rev. 2021;1(1):CD006560. doi:10.1002/14651858.CD006560.pub4.

6. Thomas EE, Taylor ML, Banbury A, et al. Factors influencing the effectiveness of remote patient monitoring interventions: a realist review. BMJ Open. 2021;11(8):e051844. doi:10.1136/bmjopen-2021-051844.

7. Claggett J, Petter S, Joshi A, Ponzio T, Kirkendall E. An infrastructure framework for remote patient monitoring interventions and research. J Med Internet Res. 2024;26:e51234. doi:10.2196/51234.

8. Tian J, Wang HY, Peng SH, Tao YM, Cao J, Zhang XG. Experiences of older people with multimorbidity regarding self-management of diseases: a systematic review and qualitative meta-synthesis. Int J Nurs Pract. 2024;30(5):e13289. doi:10.1111/ijn.13289.

9. Taylor ML, Thomas EE, Vitangcol K, et al. Digital health experiences reported in chronic disease management: an umbrella review of qualitative studies. J Telemed Telecare. 2022;28(10):705-717. doi:10.1177/1357633X221119620.

10. Jiang X, Wang L, Leng Y, et al. The level of electronic health literacy among older adults: a systematic review and meta-analysis. Arch Public Health. 2024;82(1):204. doi:10.1186/s13690-024-01428-9.

11. Robertson ML, Phung A, Bhatnagar S, et al. Assessing the wellbeing of family caregivers of multimorbid and homebound older adults: a scoping literature review. J Am Geriatr Soc. 2023;71(1):268-275. doi:10.1111/jgs.18077.

12. Read EA, Gagnon DA, Donelle L, et al. Stakeholder perspectives on in-home passive remote monitoring to support aging in place in the province of New Brunswick, Canada: rapid qualitative investigation. JMIR Aging. 2022;5(2):e31486. doi:10.2196/31486.

13. van Steenkiste J, Lupgens N, Kool M, Dohmen D, Verberk-Jonkers I. Alert reduction and telemonitoring process optimization for improving efficiency in remote patient monitoring programs: framework development study. JMIR Med Inform. 2025;13:e66066. doi:10.2196/66066.

14. May CR, Albers B, Bracher M, et al. Translational framework for implementation evaluation and research: a normalisation process theory coding manual for qualitative research and instrument development. Implement Sci. 2022;17(1):19. doi:10.1186/s13012-022-01191-x.

15. Smyth RC, et al. A systematic review of the use of burden of treatment theory. J Multimorb Comorb. 2025;15:26335565251314828. doi:10.1177/26335565251314828.

16. Braun V, Clarke V. Thematic analysis: a practical guide. London: SAGE; 2021.

17. Terry G, Hayfield N. Essentials of thematic analysis. Washington (DC): American Psychological Association; 2021.

18. Nowell LS, Norris JM, White DE, Moules NJ. Thematic analysis: striving to meet the trustworthiness criteria. Int J Qual Methods. 2017;16:1609406917733847. doi:10.1177/1609406917733847.

19. Chu F, et al. Patient experience in a remote patient monitoring program for hypertension: a qualitative study. Am J Hypertens. 2024;37(11):861-867. doi:10.1093/ajh/hpae086.

20. Baldan GA, Dello Iacono I, Giurissevich V, et al. Older adults' self-care and family caregiver contribution in multiple chronic conditions: a dyadic qualitative study. J Adv Nurs. 2026;82(6):6444-6463. doi:10.1111/jan.70246.

21. Hailu GN, Abdelkader M, Meles HA, Teklu T. Understanding the support needs and challenges faced by family caregivers in the care of their older adults at home: a qualitative study. Clin Interv Aging. 2024;19:481-490. doi:10.2147/CIA.S451833.

22. Coffey JD, et al. Development and implementation of a nurse-based remote patient monitoring program for ambulatory disease management. Front Digit Health. 2022;4:1052408. doi:10.3389/fdgth.2022.1052408.

23. Aslan A, Mold F, van Marwijk H, Armes J. What are the determinants of older people adopting communicative e-health services: a meta-ethnography. BMC Health Serv Res. 2024;24:60. doi:10.1186/s12913-023-10372-3.

24. Hall Dykgraaf S, Desborough J, de Toca L, et al. Older people, the digital divide and use of telehealth during the COVID-19 pandemic. Aust J Gen Pract. 2022;51(9):721-724. doi:10.31128/AJGP-03-22-6358.

25. Barbato A, et al. Effects of goal-oriented care for adults with multimorbidity: a systematic review and meta-analysis. J Eval Clin Pract. 2022;28(3):371-381. doi:10.1111/jep.13674.