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Wearable Sensor Technology and Rehabilitation Outcomes: Evaluating Patient Engagement, Treatment Adherence, and Functional Recovery in Physiotherapy

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Abstract
Wearable sensor technologies offer potential to improve rehabilitation outcomes by enhancing patient engagement, treatment adherence, and functional recovery. Their adoption in low-resource settings, such as Pakistan, remains underexplored. To evaluate the impact of wearable sensor adoption on patient engagement, treatment adherence, and functional recovery in physiotherapy, and to examine the moderating roles of clinician experience and ethical considerations. A cross-sectional study was conducted with 400 patients and 50 physiotherapists across urban and rural clinics in Pakistan. Patients used wearable motion sensors for 4 weeks, while engagement, adherence, and functional outcomes were recorded. Partial Least Squares Structural Equation Modeling (PLS-SEM) assessed relationships among constructs, including mediation and moderation effects. Wearable sensor adoption positively influenced patient engagement ($\beta=0.48$, $p<0.001$) and treatment adherence ($\beta=0.41$, $p<0.001$). Both engagement and adherence significantly predicted functional recovery ($\beta=0.52$ and 0.44, respectively; $p<0.001$). Patient engagement partially mediated the effect of wearable adoption on recovery outcomes. Clinician experience and ethical considerations moderated the impact of wearables on engagement and adherence. Urban clinics showed slightly higher adoption and recovery outcomes, while engagement and adherence were comparable across settings. Wearable sensor integration in physiotherapy enhances patient engagement, adherence, and functional recovery. Clinician expertise and ethical safeguards are critical to maximizing benefits. Policy initiatives should promote training, ethical frameworks, and accessibility to wearable technologies, particularly in low-resource contexts.

Keywords: *Wearable Sensors; Physiotherapy; Patient Engagement; Treatment Adherence; Functional Recovery; Digital Health; Pakistan*

Introduction

Rehabilitation medicine has increasingly embraced wearable sensor technology as a tool to enhance patient engagement, monitor adherence, and improve functional recovery in physiotherapy and allied health practice. Wearable sensors, including accelerometers, gyroscopes, and pressure sensors, allow continuous monitoring of patient movement patterns, providing objective data that complement clinician assessments [1–3]. These technologies have been shown to facilitate real-time feedback, personalize exercise programs, and enhance treatment adherence, which are critical determinants of rehabilitation success [4,5].

Despite their potential, adoption of wearable technology in physiotherapy remains uneven, particularly in low- and middle-income countries (LMICs) such as Pakistan. Barriers include limited access to devices, clinician training gaps, infrastructural constraints, and ethical concerns around patient privacy [6,7]. Understanding how wearable sensor adoption impacts treatment outcomes and workflow efficiency in real-world clinical settings is therefore critical for optimizing rehabilitation interventions.

Problem Statement

Conventional rehabilitation relies heavily on manual observation and patient-reported progress, which can introduce subjectivity, errors, and inconsistent treatment adherence [8]. Wearable sensors offer an opportunity to standardize assessment, enhance patient engagement, and facilitate data-driven decision-making. However, empirical evidence examining the relationship between wearable adoption, treatment adherence, and functional recovery—particularly in LMIC contexts is limited. Moreover, the role of patient engagement as a mediating factor and the moderating influence of clinician experience remain underexplored.

Research Questions and Hypotheses

Based on the gaps identified, this study addresses the following research questions:

- **RQ1:** How does the adoption of wearable sensor technology influence patient engagement and treatment adherence in physiotherapy?
- **RQ2:** To what extent does wearable sensor adoption improve functional recovery outcomes?
- **RQ3:** Does patient engagement mediate the relationship between wearable sensor use and rehabilitation outcomes?
- **RQ4:** How do clinician experience and ethical considerations moderate the effects of wearable technology on outcomes?

From these questions, the following hypotheses are proposed:

- **H1:** Wearable sensor adoption positively influences patient engagement.
- **H2:** Wearable sensor adoption positively affects treatment adherence.
- **H3:** Patient engagement mediates the relationship between wearable sensor adoption and functional recovery.
- **H4:** Clinician experience moderates the relationship between wearable adoption and rehabilitation outcomes.
- **H5:** Ethical considerations (privacy, data consent) moderate the impact of wearable adoption on patient engagement and outcomes.

Significance of the Study

This research contributes to the evidence base on digital health interventions in physiotherapy by integrating objective wearable sensor data with clinical outcomes in a Pakistani context. The study's findings can inform clinical protocols, guide device selection and training, and support policy initiatives to promote equitable access to digital rehabilitation tools. Additionally, it addresses ethical and workflow considerations, providing a framework for responsible adoption of wearable technologies in allied health practice [9,10].

Literature Review

Evolution of Wearable Sensor Technology in Rehabilitation

Wearable sensors have become increasingly prominent in physiotherapy and rehabilitation, offering continuous, objective measurement of movement, posture, and adherence to exercise. These devices can include inertial measurement units (IMUs), accelerometers, gyroscopes, strain sensors, and biofeedback systems [1]. A review in *Journal of Neuro Engineering and Rehabilitation* outlined how wearable sensor systems have been used for home monitoring, tele-rehabilitation, and real-time feedback, supporting both clinical and patient-led therapy [2].

The ability of wearables to provide detailed motion data such as joint angle, acceleration, and gait parameters has allowed physiotherapists to assess functional recovery more precisely than with traditional subjective observation [3]. These benefits have fostered adoption in diverse clinical scenarios, including

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post-stroke gait rehabilitation and post-surgical recovery.

Clinical Outcomes and Functional Recovery

Several recent studies provide empirical evidence that wearable sensors contribute to improved rehabilitation outcomes. For instance, a clinical trial in 2024 assessed the use of wearable sensors for gait analysis in post-stroke patients receiving repetitive transcranial magnetic stimulation (rTMS). Using objective gait metrics, the researchers found statistically significant improvements in gait cycle time, stride length, and walking speed, in addition to functional measures like the Barthel Index and balance scales ($p < 0.05$) [3]. These findings suggest that wearable sensors can deliver clinically meaningful feedback and aid in the optimization of therapy.

In orthopedic rehabilitation, wearable sensor–based biofeedback systems have shown high usability and adherence. A mixed-methods study with patients recovering from knee replacement surgery revealed a 79% adherence rate over two weeks, along with positive user experience ratings. Importantly, the System Usability Scale (SUS) mean was 90.8, indicating strong acceptance among users [4]. These data demonstrate how wearables can improve adherence and engagement in home-based exercise programs.

Another pilot study in the UK involved pre- and postoperative rehabilitation of knee arthroplasty patients using a wearable sensor (BPMpathway) to monitor and adjust exercise regimens remotely. Over nine weeks, patients' range of motion increased notably, and clinicians reported a 35.7% reduction in face-to-face physiotherapy appointments. Over 80% of participants reported a positive experience, stating that the wearable platform motivated them and was easy to use [5]. This highlights the potential for wearables to reduce burdens on outpatient services while maintaining or improving rehabilitation outcomes.

Patient Engagement and Treatment Adherence

Wearable sensors offer a powerful tool to enhance patient engagement by providing real-time feedback, goal tracking, and motivational features. When patients can monitor their own progress via wearable devices, they may feel more empowered and committed to their rehabilitation program. This is especially critical in physiotherapy, where long-term adherence to exercises can be challenging.

Qualitative user-evaluation studies of biofeedback systems show that patients appreciate the sense of control and feedback provided by sensors; they report feeling encouraged when they can see real-time performance metrics and adjust their effort accordingly [4]. High usability scores combined with strong adherence rates suggest that wearable systems are not only clinically effective but also acceptable to patient

Clinician Acceptance and Usability Concerns

Despite the potential, clinician acceptance of wearable technology in physiotherapy is mixed. A recent systematic acceptance study involving physical therapists revealed that although therapists initially rated the perceived usefulness and ease-of-use of knee sensor systems positively, actual use tended to decrease over time. In one focus group, concerns included setup complexity, calibration time, and sensor accuracy [6]. These challenges point to the importance of involving clinicians early in the design and development of wearable systems to ensure practicality in real-world settings.

Patient-reported experiences, as seen in the ARK study with total knee arthroplasty, also highlight areas for improvement. Clinicians and patients alike suggested enhancements to the user interface, better communication tools, and more robust feedback mechanisms [7]. Ensuring that wearable devices are not only technically effective but also user-friendly is critical for sustained adoption.

Applications in LMIC and Resource-Constrained Settings

Wearable sensors also hold promise for expanding access to rehabilitation in low-resource settings. Recent practice surveys conducted among physiotherapists in Pakistan revealed that over 70% were already using wearable technology in their clinics, primarily activity trackers and heart-rate monitors, and perceived benefits in patient monitoring, engagement, and adherence [8]. However, they also cited significant barriers, including cost, technical difficulties, and patient discomfort.

Moreover, integrating wearables into home-based rehabilitation protocols could reduce dependency on frequent clinic visits, which is particularly beneficial where access to physiotherapy is limited. Indeed, wearable biofeedback devices that support remote monitoring are under clinical investigation in Pakistan; one trial (NCT06960330) is evaluating the effectiveness of such devices in elderly patients with arthritis or fibromyalgia [9]. If successful, this model could dramatically improve scalability and equity in allied health delivery.

Ethical, Privacy, and Governance Challenges

Adoption of wearable sensor technologies raises important ethical and privacy considerations. These devices collect continuous and granular health data, raising risks related to data security, third-party access, and informed consent [10]. According to care ethics literature, patients must not be reduced to data points; rather, their autonomy, dignity, and preferences must be respected [11].

Security vulnerabilities are also a concern. Without adequate encryption, wearables may expose sensitive health information to breaches, potentially undermining trust and causing harm [10]. The justice dimension also matters: if advanced wearable technologies are only available to wealthier or urban patients, health disparities may widen. Regulatory frameworks remain lagging in many jurisdictions. There is a need for guidelines to ensure data ownership, transparency of algorithms, and clinician accountability when treatment decisions are informed by wearable-derived metrics [12]. Addressing these gaps is essential for ethical and equitable deployment of wearable technologies in rehabilitation.

Emerging Trends and Future Directions

Recent technological advances promise to address some of these challenges. For example, a 2025 development introduced a wearable strain-sensor shoulder patch capable of detecting muscular fatigue and compensatory motion during exercises, offering real-time motion compensation feedback [13]. Similarly, stretchable and self-adhesive triboelectric sensors have been developed to monitor joint movement continuously and power themselves from biomechanical motion, opening new possibilities for low-cost, long-term wearable rehabilitation in home settings [14].

Explainable AI integrated with wearable sensor data is also gaining traction. By analyzing wearable motion data through interpretable models, clinicians can receive not only predictions of recovery but also understandable explanations for why certain adjustments are needed, potentially increasing trust and adoption.

Gaps in the Literature

Despite promising advances, several gaps remain:

1. **Limited large-scale RCTs in LMICs:** While small pilot trials exist, there is a dearth of randomized controlled trials evaluating functional recovery and cost-effectiveness of wearable sensor–assisted rehabilitation in low-resource contexts.

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2. **Long-term adherence data:** Many usability and adherence studies are short-term; long-term maintenance of use and patient outcomes remain under-studied.
3. **Clinician-integration research:** More research is needed on how physiotherapists integrate wearable data into treatment planning and how this affects clinical decision-making.
4. **Robust ethical and regulatory frameworks:** There is a lack of consensus and implementation of governance policies specifically tailored to rehabilitation wearables, especially in LMIC settings.

Addressing these gaps will be crucial to fully realize the potential of wearable sensors in allied health, particularly for scaling rehabilitation in underserved communities.

Methodology

Research Design

This study employed a quantitative, cross-sectional survey and observational design, integrating patient outcome data with physiotherapist-reported workflow and adherence metrics. The design was chosen to examine the relationships between wearable sensor adoption, patient engagement, treatment adherence, and functional recovery outcomes. The study also assessed the moderating effects of clinician experience and ethical considerations.

Population and Sampling

The study population consisted of physiotherapists and their patients undergoing musculoskeletal or neurological rehabilitation in urban and rural clinics in Pakistan. Inclusion criteria for patients were: age ≥18 years, enrolled in physiotherapy for at least 2 weeks, and willingness to use wearable sensor devices. Clinicians were included if they had at least 2 years of professional experience.

A stratified random sampling approach was used to ensure representation across clinic type (urban vs. rural), patient age groups, and treatment modalities. A total sample of 400 patients and 50 physiotherapists was targeted based on power calculations for PLS-SEM (minimum sample requirement: 10 times the maximum number of paths pointing at a construct) [1]

Data Collection

Data collection involved three primary instruments:

1. **Wearable Sensor Data:** Patients used wearable motion sensors to capture movement patterns, exercise repetitions, range of motion, and adherence over a 4-week period. Devices included wrist- and ankle-worn IMUs and knee motion sensors.
2. **Patient Engagement and Adherence Survey:** A validated 15-item questionnaire measured perceived engagement, motivation, and adherence to prescribed exercises on a 5-point Likert scale [2].
3. **Functional Recovery Outcomes:** Clinicians recorded objective functional outcomes using standardized tools (e.g., Barthel Index, Timed Up and Go test, and joint-specific range-of-motion measures) at baseline and week 4.

Ethical approval was obtained from the University of Health Sciences Pakistan Institutional Review Board. Patients provided informed consent for both sensor use and survey participation.

Conceptual Framework and Hypotheses

The conceptual framework (Figure 1) posits that wearable sensor adoption positively influences patient engagement and treatment adherence, which in turn drive functional recovery outcomes. Clinician

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experience and ethical considerations are modeled as moderators influencing the strength of these relationships.

Hypotheses:

- **H1:** Wearable sensor adoption positively impacts patient engagement.
- **H2:** Wearable sensor adoption positively impacts treatment adherence.
- **H3:** Patient engagement mediates the effect of wearable adoption on functional recovery.
- **H4:** Clinician experience moderates the impact of wearable adoption on patient engagement and adherence.
- **H5:** Ethical considerations moderate the relationship between wearable adoption and outcomes.

Measurement Model

All constructs were measured using reflective indicators on a 5-point Likert scale. Wearable adoption was operationalized using a combination of device usage frequency, duration, and functional metrics logged by the sensors. Patient engagement included attention, motivation, and perceived usefulness, while treatment adherence reflected consistency in following prescribed exercises. Functional recovery was assessed using validated clinical outcome measures.

Reliability and validity

were evaluated using Cronbach's alpha (>0.7), composite reliability (>0.7), and average variance extracted (AVE >0.5) for all latent constructs.

Data Analysis

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM**)** in SmartPLS 4. PLS-SEM was chosen due to its suitability for predictive modeling, small-to-medium sample sizes, and handling of complex models with mediators and moderators [1]. Bootstrapping with 5,000 subsamples was conducted to evaluate path significance. Multi-group analysis examined differences between urban vs. rural clinics and novice vs. experienced clinicians. Descriptive statistics, correlations, and reliability measures were reported alongside PLS-SEM results. Missing data (<5%) were handled using mean imputation.

Ethical Considerations

- Informed consent was obtained from all participants.
- Data privacy and security were maintained by encrypting sensor data and anonymizing survey responses.
- Ethical principles of autonomy, non-maleficence, and beneficence guided the study, particularly regarding continuous patient monitoring.

Figure 1. Conceptual Framework

[Wearable Sensor Adoption] → [Patient Engagement] → [Functional Recovery Outcomes]
↘ [Treatment Adherence] ↗
[Clinician Experience] — Moderator
[Ethical Considerations] — Moderator

Results & Interpretation

Descriptive Statistics

The study included 400 patients (mean age 42.8 ± 12.6 years; 55% male) and 50 physiotherapists (mean experience 8.2 ± 3.7 years). Patients were distributed across urban (60%) and rural (40%) clinics. Table 1

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summarizes descriptive statistics for key constructs.

Table 1. Descriptive Statistics of Study Variables

Variable	Mean	SD	Min	Max	Cronbach α
Wearable Adoption	4.12	0.65	2.0	5.0	0.89
Patient Engagement	4.05	0.70	1.8	5.0	0.91
Treatment Adherence	4.01	0.68	2.0	5.0	0.88
Functional Recovery	3.98	0.72	1.5	5.0	0.90
Ethical Considerations	3.76	0.81	2.0	5.0	0.85
Clinician Experience	8.2	3.7	2	18	–

Measurement Model Assessment

The PLS-SEM measurement model indicated strong reliability and validity. All factor loadings exceeded 0.70, composite reliability ranged from 0.88 to 0.92, and AVE values were above 0.50, demonstrating convergent validity. Discriminant validity was confirmed using the HTMT criterion (<0.85) [1,2].

Structural Model Results

The structural model tested hypotheses H1–H5 using bootstrapping (5,000 subsamples). **Figure 2** shows path coefficients and significance.

Figure 2. PLS-SEM Path Model of Wearable Sensor Adoption and Rehabilitation Outcomes
[Wearable Sensor Adoption] → [Patient Engagement] ($\beta=0.48$, $p<0.001$)
[Wearable Sensor Adoption] → [Treatment Adherence] ($\beta=0.41$, $p<0.001$)
[Patient Engagement] → [Functional Recovery] ($\beta=0.52$, $p<0.001$)
[Treatment Adherence] → [Functional Recovery] ($\beta=0.44$, $p<0.001$)
[Clinician Experience] moderates → paths $\beta=0.12$–0.18, $p<0.05$
[Ethical Considerations] moderates → paths $\beta=0.10$–0.15, $p<0.05$

Table 2. Structural Model Path Coefficients and Hypothesis Testing

Hypothesis	Path	β	t-value	p-value	Supported?
H1	Wearable → Engagement	0.48	7.32	<0.001	Yes
H2	Wearable → Adherence	0.41	6.15	<0.001	Yes
H3	Engagement → Recovery	0.52	8.01	<0.001	Yes
H3b	Mediation (Engagement)	0.25	5.02	<0.001	Yes
H4	Clinician Experience moderation	0.15	2.85	0.004	Yes
H5	Ethical Considerations moderation	0.13	2.41	0.016	Yes

Mediation and Moderation Analysis

Patient engagement partially mediated the effect of wearable adoption on functional recovery (indirect effect $\beta=0.25$, $p<0.001$). This indicates that increased engagement through wearable devices translates into measurable improvements in rehabilitation outcomes.

Clinician experience moderated the relationship between wearable adoption and both patient engagement and adherence. More experienced clinicians were able to leverage wearable data more effectively, amplifying the positive effects on patient outcomes [3,4].

Ethical considerations (privacy, informed consent) also had a moderating effect, suggesting that patients

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and clinicians who were confident about ethical safeguards demonstrated stronger engagement and adherence.

Urban vs. Rural Comparison

A multi-group analysis comparing urban and rural clinics revealed:

- Urban clinics had slightly higher wearable adoption (mean 4.21 vs. 3.98, $p<0.05$)
- Functional recovery outcomes were higher in urban settings (mean 4.12 vs. 3.78, $p<0.05$)
- No significant differences were observed in patient engagement and treatment adherence between groups, suggesting that engagement mechanisms can work across contexts if wearable technology is available [5].

Interpretation

These results suggest that wearable sensor adoption is strongly associated with improved patient engagement and treatment adherence, which in turn enhance functional recovery. The findings align with previous studies highlighting the clinical benefits of objective monitoring and real-time feedback in physiotherapy [6–8].

Moderating effects of clinician experience highlight the importance of training and familiarity with digital tools. Ethical considerations also influence outcomes, reinforcing that trust, consent, and data privacy are integral to successful wearable adoption [9].

Taken together, the findings support the development of AI-augmented, sensor-based rehabilitation frameworks in allied health, especially for LMIC contexts such as Pakistan, where clinician workload is high and patient monitoring resources are limited.

Discussion

The present study examined the effects of wearable sensor adoption on patient engagement, treatment adherence, and functional recovery outcomes in physiotherapy, with clinician experience and ethical considerations as moderators. The results provide empirical evidence supporting the integration of digital wearable technologies in allied health, particularly in rehabilitation contexts within Pakistan.

Wearable Sensor Adoption and Patient Engagement

Consistent with prior research, wearable sensor adoption was strongly associated with higher patient engagement ($\beta=0.48$, $p<0.001$). Patients receiving real-time feedback on their performance reported increased motivation and accountability, aligning with findings from a systematic review on wearable biofeedback in rehabilitation, which highlighted improved adherence and patient empowerment through continuous monitoring [1,2]. This supports the theoretical proposition that technology-mediated self-monitoring fosters intrinsic motivation, encouraging patients to complete prescribed exercises and track progress.

Treatment Adherence and Functional Recovery

The study confirmed that wearable adoption positively influenced treatment adherence ($\beta=0.41$, $p<0.001$) and, in turn, functional recovery ($\beta=0.52$ for engagement; $\beta=0.44$ for adherence). These findings corroborate recent clinical trials demonstrating that sensor-assisted rehabilitation significantly improves objective mobility and strength outcomes compared to conventional therapy alone [3,4]. Importantly, partial mediation by patient engagement indicates that while adherence is directly enhanced by wearables, engagement amplifies the effect on recovery. This is consistent with behavior change theory, suggesting that active participation mediates the effectiveness of interventions [5].

Moderating Role of Clinician Experience

Clinician experience moderated the relationship between wearable adoption and patient outcomes, highlighting that experienced therapists leveraged sensor data more effectively to adjust treatment intensity, correct movement errors, and provide personalized feedback. This aligns with previous findings in digital rehabilitation, where clinician familiarity with technology influenced both patient compliance and clinical decision-making [6]. Consequently, training programs and continuous professional development are critical to optimize the benefits of wearable sensor integration.

Ethical Considerations and Trust

Ethical safeguards, including informed consent, privacy protection, and transparent data handling, moderated the impact of wearable technology on engagement and adherence. This emphasizes that patient trust is a prerequisite for effective technology adoption, especially in LMIC settings where digital literacy varies. Similar concerns have been documented in studies of tele-rehabilitation and AI-assisted monitoring, where ethical lapses can reduce patient participation and compromise clinical outcomes [7,8].

Urban–Rural Differences

Multi-group analysis revealed slightly higher adoption and recovery outcomes in urban clinics. However, engagement and adherence did not significantly differ between urban and rural settings. This suggests that wearable technologies, when available and supported, can bridge gaps in rehabilitation delivery across diverse settings, offering a scalable solution to resource constraints in rural healthcare centers [9]. Policy initiatives to increase device accessibility and clinician training could further mitigate urban–rural disparities.

Implications for Rehabilitation Practice

The study provides actionable insights for allied health practitioners:

1. **Integration of wearable sensors into routine rehabilitation** can enhance objective assessment, personalize treatment, and improve patient outcomes.
2. **Clinician training programs** should accompany technology deployment to ensure optimal interpretation and use of sensor data.
3. **Ethical frameworks and patient education** must be established to build trust, safeguard data, and encourage consistent use.
4. **Remote monitoring opportunities** facilitated by wearable sensors can reduce clinic visits while maintaining high-quality care, particularly in resource-limited areas.

Limitations and Future Research

While the study included a robust sample (n=400 patients, n=50 clinicians), its cross-sectional design limits causal inference. Longitudinal studies and randomized controlled trials are needed to confirm long-term effects on functional recovery. Additionally, sensor accuracy and calibration issues, as well as patient variability in digital literacy, warrant further investigation. Future research should also explore cost-effectiveness analyses, to inform scalable implementation strategies in LMICs.

Conclusion & Policy Implication

Conclusion

This study demonstrates that wearable sensor adoption in physiotherapy significantly improves patient engagement, treatment adherence, and functional recovery outcomes. The findings confirm that patient engagement partially mediates the effect of wearable technologies on rehabilitation outcomes. Additionally, clinician experience and ethical considerations moderate these relationships, highlighting the importance of skilled professional guidance and robust privacy safeguards.

The study underscores the transformative potential of digital wearable technologies in allied health settings, particularly for LMICs such as Pakistan. By enabling objective monitoring, real-time feedback, and remote supervision, wearables can enhance the quality, efficiency, and accessibility of rehabilitation services. The results also emphasize the need to integrate ethical, technological, and human factors to maximize clinical benefits.

Policy Implications

1. **Integration into National Health Policies:** Policymakers should recognize wearable sensor technologies as effective tools in physiotherapy and include them in national rehabilitation guidelines, especially for rural and underserved areas.
2. **Clinician Training and Capacity Building:** Training programs should be established to equip physiotherapists with the necessary skills to interpret sensor data and optimize patient care.
3. **Data Governance and Privacy Frameworks:** Regulations and standard operating procedures must ensure secure data storage, informed consent, and patient autonomy, promoting trust and adherence.
4. **Resource Allocation for Accessibility:** Investments are needed to subsidize wearable devices, particularly in public healthcare settings, to prevent exacerbation of urban-rural or socioeconomic disparities.
5. **Research and Development Incentives:** Support for R&D in low-cost, context-appropriate wearable sensors will facilitate scalable adoption and innovation within LMIC healthcare systems.

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