

Evaluating Conversational Speech Features for Early Mild Cognitive Impairment Using Social Robots for Prevention and Treatment

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ABSTRACT

Mild Cognitive Impairment (MCI) is an important stage between normal cognitive ageing and dementia, making its early identification particularly valuable for timely intervention and long-term care. This paper examines the potential of Artificial Intelligence (AI) in analysing conversational speech as a non-invasive method for identifying subtle indicators of cognitive decline. Speech involves several cognitive processes, including memory, attention, executive functioning, and language. Changes in features such as pauses, speech rate, word-finding difficulties, lexical diversity, and sentence complexity may therefore provide useful information about an individual's cognitive state, and the role of socially assistive robots can be in addressing this cognitive impairment. The role of clinical psychologists is also considered, particularly in interpreting AI-generated information, developing personalised interventions, and making clinical decisions. The analysis suggests that AI-based speech analysis has potential as a complementary approach to conventional cognitive assessments, while social robots can make monitoring more continuous and less dependent on occasional clinical visits.

Robot-assisted cognitive training and lifestyle interventions have also shown promising results in the studies examined. However, these technologies currently face limitations, with respect to small study populations, limited long-term validation, language and cultural differences, privacy concerns, patient engagement, and the cost of specialised robotic systems. The paper ultimately argues for a collaborative approach in which AI and social robots assist healthcare professionals rather than replace them. While robots can collect data, provide reminders, deliver structured exercises, and identify changes requiring further attention, clinical psychologists remain essential for interpretation, empathy, diagnosis, and personalised care. The future application of these technologies will therefore depend on combining technological capabilities with human clinical expertise in a responsible and accessible manner.

Keywords: Mild cognitive impairment (MCI), clinical psychologist, conversational speech,

neurodegenerative diseases, Artificial intelligence (AI), Socially assistive robots (SARs), Speech-based biomarkers.

1. Introduction

Cognitive decline, particularly Alzheimer's disease (AD) and related dementia, is becoming one of the more pressing global health issues today. It is placing growing demand on healthcare systems and caregivers, while pushing society to pay closer attention to the issue. In 2021, the World Health Organization (WHO) reported that around 57 million people worldwide were living with dementia, with close to 10 million new cases diagnosed each year . Most of this increase traces back to the rapidly aging global population. Dementia also places a substantial social and economic burden across the world . As more people are affected, catching cognitive decline early becomes essential, since interventions and lifestyle changes work best in its initial stages. This drives the need for reliable methods to identify those at risk.

Mild cognitive impairment (MCI) sits in the gap between normal aging and dementia. It is marked by cognitive problems, particularly in memory, attention, language, and visuospatial skills. These noticeable issues set MCI apart from healthy aging, which is why it is often described as a borderline condition. However, it is not classified as dementia, since it does not yet interfere with a person's independence or ability to manage daily activities . MCI does raise the risk of developing Alzheimer's disease and other dementias, but that risk varies from person to person, and not everyone with MCI goes on to develop dementia .

Early and accurate diagnosis of MCI matters because neurodegenerative diseases progress over time. As a transitional stage between normal cognitive aging and dementia, MCI opens a critical window for early treatment . Recognising cognitive changes at this stage enables timely medical and non-medical interventions, encourages beneficial lifestyle changes, and helps patients and their families plan for the long term . Early diagnosis may also help slow cognitive decline, preserve independence, improve quality of life, and reduce the long-term burden on caregivers and healthcare systems.

A particularly effective tool for enabling early identification is spontaneous conversational speech. Producing speech is a complex task that can serve as a sensitive indicator, reflecting the simultaneous integration of key cognitive processes such as memory, attention, executive functioning, and language. Research shows that harmful changes in the brain disrupt these processes early on, causing subtle speech and language changes to appear as reliable signs of decline long before traditional neuropsychological tests or formal clinical diagnoses reveal them.

Evaluating these subtle speech indicators accurately requires advanced Artificial Intelligence (AI) models that can pick up on complex speech patterns human observers might miss. These

systems pull out multiple features to help distinguish cognitive impairment, including the frequency and length of pauses, struggles to find words, and vocabulary richness. AI can also measure speech rate, verbal fluency, and sentence complexity in an objective way. One newer application of these models is socially assistive robots, which combine assistive technology with social interaction. Unlike standard voice assistants, these robots have a physical presence that encourages more natural conversation and lowers patient anxiety. They are designed for repeated, ongoing interaction, which helps keep users engaged and allows for long-term speech data collection in natural home settings. This kind of continuous monitoring gives clinical psychologists a more realistic picture of a patient's health, while also providing steady companionship and cognitive engagement.

This paper builds on that body of work by examining how Artificial Intelligence can assess Mild Cognitive Impairment through conversational speech analysis. It looks at how AI-driven social robots can support early identification, prevention, and management of cognitive decline, and at the role socially assistive robots play in providing ongoing, natural speech monitoring and cognitive engagement. At the same time, the paper explores how clinical psychologists and other healthcare professionals can bring these technologies into assessment and patient care. Taken together, this discussion shows how AI-powered conversational systems can support traditional diagnostic methods and make cognitive healthcare more accessible, timely, and personalised.

2. Background

Traditional screening for MCI relies mainly on standardised neuropsychological assessments such as the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA), which evaluate memory, attention, and language. These assessments are often supplemented by neuroimaging and biological biomarkers, including structural MRI, PET scans, and CSF assays that detect β -amyloid and tau pathology within the amyloid-tau-neurodegeneration (ATN) framework (the ATN framework classifies Alzheimer's-related brain changes using three biomarker categories, Amyloid deposits, Tau tangles, and Neurodegeneration, allowing diagnosis based on underlying biology rather than symptoms alone). While clinically well-established, these approaches are manual, time-consuming, and limited by the cost and invasiveness of advanced procedures. Clinical testing environments can also bring on anxiety and feelings of social judgment that hurt performance and validity, and standardized scores often overlap between healthy older adults and those with MCI, which can miss subtler markers of early decline. More than half of community dementia cases are estimated to go undetected, which points to a pressing need for more accessible and scalable screening methods. That need is reinforced by evidence that nearly 45% of dementia risk is attributable to modifiable factors, ones that respond best to intervention when caught early.

Spontaneous conversational speech has gained attention as a non-invasive, scalable biomarker, since speech production draws on multiple cognitive processes that are affected early in cognitive decline. *Compared with healthy adults, individuals with MCI show more frequent pauses and hesitations, slower speech rate, reduced lexical diversity, simplified syntax, and word-finding difficulties.* Semantic verbal fluency, lexical richness, noun phrase rate, and overall speech quantity have been identified as particularly predictive features; individual tasks and combined acoustic-linguistic models have reported classification accuracies of up to 95% for MCI detection, although performance varies considerably depending on the task, dataset, and model used. A recent systematic review and meta-analysis further supports the diagnostic value of these speech-based markers, reporting sensitivity and specificity broadly comparable to conventional neuropsychological tools while requiring substantially less clinician time to administer.

Socially Assistive Robots (SARs) have emerged as a way to translate these speech-analysis capabilities into more natural, less clinical assessment settings by pairing conversational AI with embodied human-robot interaction. Robots such as Pepper, Furhat, and QTrobot have been used to administer cognitive screening tasks and passively monitor natural speech over time, with their physical presence encouraging more spontaneous, representative speech than voice assistants or tablet-based tools, and reducing the testing-related anxiety associated with clinical settings. Human-robot interaction studies have further demonstrated the feasibility of longitudinal monitoring in home and clinical settings, enabling continuous, objective speech data collection and earlier identification of subtle cognitive change. Recent work has moved beyond proof-of-concept by developing purpose-built conversational speech systems for robots specifically designed to elicit and extract cognitive-decline biomarkers from people living with dementia in real-world interactions, rather than relying solely on adapted screening scripts.

Beyond screening, AI-supported interventions delivered through these robotic platforms have emerged as promising non-pharmacological approaches to managing MCI, particularly Computer-Assisted Cognitive Rehabilitation (CACR) and Cognitive Stimulation Therapy (CST). SAR systems such as PIO and Sil-Bot deliver interactive cognitive training and reminiscence therapy, and several studies report resulting improvements in cognitive function, emotional well-being, and social engagement.

Beyond their therapeutic uses, these systems are increasingly being folded into clinical workflows: automating routine assessment and analyzing speech and behavioral data allows clinicians to have objective evidence to support diagnosis and personalized care planning, while cutting down on the human clinician workload. Still, user-perception research on social robots administering psychological assessments, while generally positive on measures of trust, warmth, and openness, has been subjected to practical limitations such as imperfect speech recognition and limited nonverbal expressiveness, both of which matter directly for a robot's ability to

reliably capture and interpret conversational speech in an MCI context. Current SAR systems also remain limited by semi-autonomous operation, small clinical datasets, a lack of standardized protocols, language and cultural variability, and insufficient long-term validation, alongside broader concerns around data privacy and transparency. Accordingly, *AI and social robots are best positioned as decision-support tools that complement, rather than replace, healthcare professionals.* Nevertheless, **evidence supporting fully autonomous, real-world deployment of conversational AI and social robots for early MCI** screening remains limited, highlighting an important gap in the current literature. This is what this paper would attempt to address.

3. Research Gap and Methodology

This paper would analyse the use of AI and social robots in the evaluation of conversational speech to detect the existence of any mild cognitive impairment. The synergy between clinical psychologists and robots would be understood in addressing this impairment. How far can psychologists use the help of robots in addressing this malady?

The methodology adopted would be of the mixed-method type, where both quantitative and qualitative analyses would be studied from authentic secondary sources. The quantitative analysis would be explained with the help of qualitative sources.

4. Analysis

4.1 Cognitive Screening (MoCA, MMSE)

Role in Detecting, Addressing, and Treating MCI

The Montreal Cognitive Assessment (MoCA) and Mini-Mental State Examination (MMSE) are the primary first-line tools for identifying MCI, evaluating memory, attention, language, executive function, visuospatial ability, and orientation. They are administered at diagnosis and repeated periodically to track progression to support detection and monitoring. Despite strong validation and simplicity, they typically detect impairment only after a measurable decline has occurred, limiting their value for very early identification.

Role of clinical psychologist and Social robots

The clinical psychologist administers and interprets these assessments against medical history, education, behavioural observations, and psychosocial context, distinguishing genuine decline from confounds such as anxiety, fatigue, or limited literacy. Social robots such as Pepper (a humanoid robot developed by SoftBank Robotics, standing about 1.2m tall with a tablet on its chest, designed for natural conversational interaction and equipped with emotion-recognition capabilities) and Furhat (a conversational robot head developed by Furhat Robotics

(manufactured by Sweden's KTH Royal Institute of Technology), which uses back-projection to animate a human-like face onto a physical mask for natural, face-to-face interaction) can administer the same tasks consistently and non-judgmentally at home as well as record objective measures such as accuracy and reaction time, but cannot interpret results or diagnose: the robot handles standardized administration and data collection, while the psychologist retains responsibility for clinical interpretation.

4.2 Cognitive Training

Role in MCI Management

Cognitive training is meant to reduce the decline and support whatever cognitive function remains, through structured, repeated exercises that target memory, attention, executive functioning, and problem-solving. Randomised controlled trials show that robot-assisted training programmes, typically delivered twice weekly over six weeks, improve cognitive performance in older adults with MCI or mild-to-moderate dementia; some trials also report reduced depressive symptoms, though these effects are less consistent than the cognitive gains.

Role of the Clinical Psychologist and Social Robots

Sil-Bot (a humanoid robot developed by RoboCare (South Korea) that acts as a cognitive-training assistant, using an animated on-screen display to interact with users and ease anxiety) and PIO (a parrot-shaped companion robot developed by "Why Dots" for cognitive-emotional programmes with older adults) deliver structured, multi-domain training — memory, attention, executive function, and computation tasks — through repeated sessions, providing consistent, fatigue-free delivery while automatically recording performance data for clinician review. The psychologist designs a personalised rehabilitation programme based on the patient's cognitive profile, sets task difficulty and progression, and periodically evaluates and adjusts the intervention according to the patient's response. Between visits, the robot delivers these prescribed exercises and records adherence and performance data, letting the psychologist monitor rehabilitation objectively while focusing on individualised care.

4.3 Lifestyle Interventions

Lifestyle interventions target modifiable risk factors associated with cognitive decline — physical activity, nutrition, sleep, and social engagement. Lancet Commission and WHO evidence indicate that addressing these factors may delay cognitive decline, preserve independence, and improve quality of life among people with MCI. They do not reverse impairment but reduce exposure to risk factors linked to disease progression.

Role of the Clinical Psychologist and Social robots

As in 4.1 and 4.2, the psychologist sets and reviews individualised goals — here covering activity, sleep, social participation, and diet — while PIO and Sil-Bot reinforce them between visits through daily reminders and programmes such as Gymnastics with PIO, reducing loneliness and providing adherence data .

The effectiveness of robot-assisted lifestyle and cognitive interventions reported across recent studies is summarized in **Table 4.1**.

Table 1: Effectiveness of Robot-Assisted Lifestyle and Cognitive Interventions

Year	Study	Robot	Participants	Population	Key Findings
2025	Lim & Oh	PIO	66 (33/33)	Mild–moderate dementia	Intervention group improved 3.9 MMSE points vs. no change in controls (+0.1); depression also improved*
2023	Lim	PIO	62 (31/31)	Older adults living alone	Improved cognition, reduced loneliness/depression, enhanced quality of life vs. controls
2021	Park et al.	Sil-Bot	135	MCI	Robot-assisted training significantly improved cognition after six weeks vs. conventional intervention
2023	Case study	Social robot	1	MCI (time disorientation)	Six-month home interaction showed feasibility and successful long-term integration
2023	Pilot study	Social robot	5	Pre-dementia / psychosis	Participants adapted routines to the robot's schedule, indicating good engagement

*The MMSE (Mini-Mental State Examination) is scored out of 30 points, testing orientation, memory, attention, language, and visuospatial skills — lower scores mean greater cognitive impairment (below ~24 is typically flagged as impaired). So "improved by 3.9 MMSE points" in Table 4.1 means the intervention group's average score rose by 3.9 out of that 30-point scale, a meaningful cognitive gain, while the control group barely moved (+0.1).

Table 1 is based on the data and analysis indicated in section 4.3

4.4 Pharmacological Approaches

Cholinesterase inhibitors (drugs- e.g., donepezil, rivastigmine, galantamine- that block the breakdown of acetylcholine, a neurotransmitter involved in memory and learning, to help sustain higher levels of it in the brain.) and NMDA receptor antagonists (drugs -e.g., memantine- that block NMDA-type glutamate receptors to regulate excess glutamate activity and reduce excitotoxic damage to neurons) have been explored for MCI, but evidence supports their use far more strongly in established dementia than during the prodromal stage (the early phase of a disease that precedes its full, clinically recognizable symptoms — in this context, the MCI stage that comes before dementia-level impairment.), and these drugs carry side effects such as gastrointestinal disturbance, muscle cramps, and sleep disruption. No pharmacological therapy is universally recommended for MCI; management continues to emphasize non-pharmacological interventions alongside careful medical supervision.

Role of the Clinical Psychologist and Social Robots

As in the earlier sections, the psychologist monitors the patient's cognitive, behavioural, and emotional responses to medication and works with neurologists, psychiatrists, and primary care physicians when making treatment decisions. The robot's role is mainly supportive, helping patients follow their medication schedules by providing reminders and keeping track of missed doses. The final treatment plan and decisions about medication remain the responsibility of the physician.

4.5 Neuroimaging & EEG

MRI, PET, and EEG provide objective biological evidence of neurodegeneration (the progressive, irreversible loss of structure, function, and eventual death of nerve cells), often supplemented by CSF assays for *β -amyloid and tau within the Amyloid-Tau-Neurodegeneration (ATN) framework*. Unlike behavioural assessments, they detect structural, functional, and molecular changes that may precede clinical symptoms, supporting earlier, biomarker-based diagnosis of Alzheimer's disease and related disorders.

Role of the Clinical Psychologist and Social Robots

Although robots cannot carry out these investigations themselves, they can identify behavioural changes that may indicate the need for further assessment and prompt a referral for neuroimaging or EEG. The psychologist then determines whether the investigation is necessary and considers the results alongside cognitive assessments, behavioural observations, and the patient's history to form a comprehensive diagnosis.

4.6 Assistive Technologies

Beyond diagnostics, socially assistive robots (SARs) function as everyday companions supporting independent living. The psychologist treats the robot's continuous presence as an extension of therapeutic support between sessions, using information from regular interactions to observe long-term behavioural patterns and identify subtle changes not apparent during periodic clinic visits. Psychologists set therapeutic goals and evaluate wellbeing at scheduled consultations; robots reinforce these strategies through everyday interaction between visits, extending care beyond the clinic without replacing professional oversight.

Importance for Speech-Based Monitoring

A social robot's continuous home presence is an ideal platform for AI-based conversational speech analysis, the focus of this research: frequent, natural conversation generates spontaneous, longitudinal speech samples that can be analysed for changes in speech rate, pauses, lexical diversity, and syntactic complexity associated with early cognitive decline.

4.7 AI-Based Speech Analysis

AI-based speech analysis is an emerging approach for early MCI detection that uses machine learning to analyse spontaneous conversational speech for subtle linguistic, acoustic, and temporal biomarkers of cognitive decline. Unlike structured cognitive testing, it continuously analyses natural speech from everyday conversation. Features such as speech rate, pause frequency, lexical diversity, syntactic complexity, semantic coherence, and acoustic variability show considerable potential as early indicators, often detectable before symptoms become clinically apparent.

Role of the Clinical Psychologist and the Social Robots

The psychologist interprets AI-extracted speech biomarkers within the broader clinical context, integrating them with cognitive assessments, behavioural observations, history, and psychosocial factors to distinguish neurodegenerative change from depression, anxiety, hearing impairment, fatigue, or normal ageing. Diagnosis, treatment planning, and ongoing management remain the psychologist's responsibility.

Table 2: Classification Performance of AI-Based Speech Analysis

Analysis Stream	Classification Task	Performance	Key Clinical Finding
Pooled meta-analysis (21–23 studies)	MCI vs. Cognitively Unimpaired	Accuracy 80.0% (95% CI 70.0–89.0); AUC 0.78 (95% CI 0.70–0.86); Sensitivity 80.0%; Specificity 77.0%	Speech-based biomarkers show moderate, consistent diagnostic value for MCI, comparable to conventional screening, with no evidence of publication bias*
Acoustic –linguistic ML classification	Healthy Controls vs Alzheimer's Disease	Accuracy up to 80.8% (SVM, combined features)	Combining acoustic and linguistic features outperforms either domain alone
Acoustic –linguistic ML classification	Healthy Controls vs. Cognitive Impairment (MCI or AD)	Accuracy up to 80.4% (linguistic features alone)	Linguistic features alone are nearly as discriminative as combined features for the broader impaired group, including MCI
Multidomain speech vs. CSF biomarkers	Prediction of amyloid/tau/neurodegeneration (ATN) positivity	AUC 0.71–0.74 across amyloid, tau, and neurodegeneration status	Speech-derived features approach the discriminative performance of invasive CSF testing, without a lumbar puncture

*Publication bias: the tendency for studies with positive results to be published more often than those with null results, which can inflate pooled findings. In Table 4.2, "no evidence of publication bias" means Jafari et al. [10] specifically tested for this (using funnel plots and Egger's regression test) and found no sign that weaker or null-result studies were systematically missing from their pooled 80% accuracy / 78% AUC estimates — so those numbers aren't artificially inflated.

This classification that had been indicated in Table 2 is based on the data and analysis indicated in 4.7

5. Gains from using social robots in assisting clinical psychologists

- Provides objective and measurable data: Social robots can record information such as response times, adherence to treatment, and speech or other biomarkers. This gives psychologists additional evidence to support their clinical observations and assessments.
- Extends support beyond the clinic: Robots can continue monitoring and supporting patients in their everyday environment, rather than limiting interaction to scheduled clinical visits. This can also help reduce some of the workload placed on psychologists and caregivers.
- Provides companionship and reduces social isolation: Regular interaction with social robots can help reduce feelings of loneliness and social isolation, particularly among older adults who live alone.

Overall Analysis

Cognitive screening remains essential for its validation and ease of use, but both it and robot-assisted delivery remain tied to structured tasks, missing the earliest signs of decline.

Robot-assisted cognitive training produces meaningful cognitive gains across multiple RCTs, though mood and quality-of-life benefits are less consistent and transfer to everyday functioning remains uncertain.

Lifestyle interventions are an important non-pharmacological approach to MCI management, but outcomes depend heavily on patient motivation, and the evidence base still needs larger, longer-follow-up trials.

Pharmacological treatment may be part of management for selected patients, but current evidence does not support medication as a definitive MCI treatment; robots serve only a supportive, adherence-focused role here, not a therapeutic one.

Neuroimaging and EEG remain important for objective evidence of underlying pathology; robots cannot replace these investigations but can support earlier referral through continuous monitoring, laying groundwork for the AI-based approaches discussed next.

Most importantly, assistive technologies' persistent home presence enables collection of natural, longitudinal speech data difficult to obtain in conventional assessments.

AI-based speech analysis is among the most promising developments in early MCI detection, combining continuous naturalistic monitoring with machine learning, enhancing existing

diagnostic pathways rather than replacing clinicians.

Traditional MCI approaches — screening, cognitive training, lifestyle interventions, pharmacology, and neuroimaging — each add value but share limitations: delayed detection, cost, and dependence on repeated clinician involvement. AI-based conversational speech analysis offers a complementary approach — continuous, non-invasive, home-based monitoring via socially assistive robots — that can flag decline before it is clinically apparent.

Overall, the evidence supports a collaborative human-AI framework that enables earlier diagnosis and more personalised care while preserving the central role of human expertise in neurodegenerative care.

Limitations of the study

- The evidence base considered is still constrained by small sample sizes, short follow-up periods, and insufficient large-scale validation.
- Cost and uneven availability of specialised equipment or robots may limit accessibility and widen inequities in care.
- Performance and acceptance vary with language, culture, education, and individual preference.
- Continuous monitoring raises unresolved questions about privacy, informed consent, and data security.
- Sustained benefit depends on patient engagement and motivation, which is difficult to guarantee over the long term.

Conclusion and the way ahead

Robots are becoming increasingly important in healthcare because they can make several tasks easier, more consistent, and less time-consuming. In the context of Mild Cognitive Impairment, socially assistive robots can assist across several domains: cognitive screening, cognitive training, lifestyle interventions, medication management, and continuous monitoring or tracking. They can collect objective information such as response times, adherence records, and speech patterns, while also extending support beyond the clinic and into a patient's everyday life.

One of their biggest advantages is their ability to stay present in a patient's daily environment. Unlike a traditional assessment that takes place during a limited clinical visit, a social robot can interact with a person repeatedly and collect natural, longitudinal speech. This creates an

opportunity for AI to monitor features such as pauses, speech rate, lexical diversity, and syntactic complexity, which may indicate early cognitive change.

However, the increasing use of robots does not make clinical psychologists less important. In fact, their role remains central. Robots can administer standardised tasks, collect information, remind patients about interventions, and identify changes that may require attention, but they cannot replace the clinical judgement, empathy, and professional interpretation of a psychologist. The psychologist must consider the patient's medical history, behaviour, emotional state, social circumstances, and other factors before deciding what the collected information actually means.

The analysis also shows that different approaches have different roles. Cognitive screening through tools such as MoCA and MMSE remains important for identifying and monitoring impairment. Cognitive training delivered through robots such as Sil-Bot and PIO has shown improvements in cognitive performance in several studies, while lifestyle interventions can encourage physical activity, better sleep, social participation, and other behaviours associated with cognitive health. Pharmacological approaches remain under medical supervision, with robots serving mainly as adherence-support tools rather than as treatment providers. Similarly, neuroimaging and EEG continue to provide biological information that robots cannot obtain on their own.

At the same time, widespread implementation is unlikely to be simple. Specialised robots and the technology required to operate them can be expensive, and unequal availability could make these systems inaccessible to some patients. If such technologies are not implemented on a sufficiently broad scale, their cost may become an additional burden rather than reducing existing inequalities in healthcare. Language, culture, education, individual preferences, privacy, informed consent, and data security also remain important concerns.

Therefore, the future of AI and social robotics in cognitive healthcare should not be viewed as a choice between humans and machines. The more realistic possibility is a collaborative system in which robots handle repetitive monitoring and support while clinical psychologists remain responsible for interpretation, decision-making, and personalised care. Future research should focus on larger and more diverse populations, longer follow-up periods, standardized protocols, and validation in real-world settings before these technologies are adopted widely.

Overall, AI-enabled social robots have the potential to make cognitive assessment and long-term support more continuous, accessible, and personalised. Their greatest contribution may not be replacing existing clinical methods, but filling the gaps between them. A robot can observe, record, remind, and assist, but understanding the person behind that data remains a fundamentally human responsibility.

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