

CareWare: Scaffolding Situated Sensemaking for Person-Centered Dementia Care in Long-Term Care Facilities

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Person-centered dementia care requires interpreting subtle, often nonverbal behaviors, yet long-term care staff frequently lack the time and knowledge for this situated sensemaking. To address this gap, we developed CareWare, an AI-assisted smart-glasses system that models expert practice to deliver proactive, real-time coaching during music-based memory loss therapy. CareWare integrates synthesized resident profiles from CareInsights, an existing care infrastructure system developed by prior researchers. Deploying CareWare across two resource-constrained facilities, we found that it scaffolded caregivers' interpretive work by bringing resident-specific knowledge into the encounter and directing attention toward easily overlooked cues. However, longitudinal care records showed that the intervention did not alter care frequency for rarely engaged residents after withdrawal, exposing systemic challenges like inadequate staffing. We argue this approach to AI-assisted sensemaking serves as a form of resident advocacy within caregivers' practical constraints, bridging dementia-related communication challenges to make individuals' unique histories and needs visible.

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**.

Additional Key Words and Phrases: dementia care, person-centered care, smart glasses, human-AI interaction, sensemaking, field study

1 Introduction

Dementia encompasses conditions that progressively affect memory, language, reasoning, behavior, and everyday functioning [48]. An estimated 57 million people were living with dementia in 2021 [96], and a majority of long-term care (LTC) residents live with dementia [80].

Person-centered care seeks to preserve dignity, autonomy, and identity by connecting therapeutic practice with knowledge of each resident's history, preferences, routines, and values [10, 23, 42]. In this study, caregivers delivered *music-based memory loss therapy*, using familiar music, imagery, and conversation to support reminiscence and social connection. Applying resident knowledge during these interactions requires caregivers to interpret whether a person is interested, uncomfortable, tired, or asking for something else, sometimes through gaze or posture rather than speech. In practice, staffing shortages, time constraints, and high turnover make this knowledge difficult to learn and apply consistently [28, 30].

Following foundational work in organizational science by Weick, we examine this interpretive work through *sensemaking*, the process through which people organize ambiguous circumstances into an account that supports action [92]. Dementia care requires staff to interpret behavior under time pressure while integrating fragmented records with knowledge held by caregivers, families, and specialists [47]. These demands become particularly consequential when staff expect little response from residents with advanced dementia or communication impairments. Although such expectations may reflect limited time, unfamiliarity, or previous unsuccessful attempts, they can also make subtle expressions of preference or participation less likely to be recognized.

Prior HCI systems preserve resident knowledge through life-story artifacts, reminiscence tools, and synthesized care records [63, 64, 70, 79]. CareInsights and Family In The Loop (FITL), developed by Moore et al. and previously deployed at the same facilities, brought observations, clinical information, and family knowledge together for caregivers to

consult [63, 64]. With the consent of that team and the facilities, we built on those deployments and drew on the resident information they had assembled. Our work, specifically, considers how more proactive support might be beneficial for AI-assisted sensemaking in person-centered dementia care. However, consultation assumes that a caregiver has already chosen to begin an interaction, leaving an unresolved design problem for residents whom staff rarely approach because engagement is expected to be difficult or ineffective.

In this paper, we present *CareWare*, an AI-assisted smart-glasses system that delivers brief, resident-specific spoken coaching during music-based memory loss therapy. We modeled an experienced practitioner’s approach through recorded sessions and retrospective review, translated that approach into prompts for an LLM-based agent, and refined the coaching through an expert-led pilot. During deployment, the practitioner supplied observations, could withhold inappropriate suggestions, and reviewed each session, allowing us to examine proactive assistance under human oversight.

We deployed *CareWare* at two resource-constrained LTC facilities and reviewed pre- and post-intervention data on music-based memory loss care sessions involving our participants. Resident-level case analysis allowed us to compare how caregivers used, adapted, or disregarded coaching and how observations from these interactions were documented and shared. Specifically, this work focuses on the research question:

RQ. How might proactive, AI-assisted smart-glasses coaching—modeled on expert practice—scaffold caregivers’ situated sensemaking to enable person-centered dementia care?

This paper contributes a design account of translating expert practice into proactive coaching, a case-based analysis of its use during care, and an examination of whether knowledge documented during supported encounters remained available afterward.

2 Related Work

2.1 Person-Centered Dementia Care and Resident Knowledge

Person-centered dementia care emerged in response to biomedical approaches that treated dementia primarily as cognitive decline, emphasizing instead that personhood is sustained through recognition, respect, and meaningful relationships [10, 20, 42]. Even when speech is limited, residents may continue to communicate well-being through affect, attempts to initiate contact, and expressions of pleasure [43].

Music-based memory loss therapy applies these principles by using familiar music and related prompts to support autobiographical recall, emotional expression, and social connection [57]. Individualized music programs in nursing homes have also been associated with improved resident outcomes [86], while the NIH Music-Based Intervention Toolkit provides guidance for designing and reporting these interventions [21]. These approaches depend on knowledge of the resident, although a recorded preference cannot determine whether a particular activity will be appropriate during a given encounter. Caregivers must still attend to how the resident responds.

Providing care in this way also depends on whether resident-specific knowledge remains available across staff, shifts, and changes in a resident’s condition. Documentation in long-term care commonly prioritizes clinical and regulatory requirements, while biographical and relational information remains informal or unrecorded [3, 7, 31]. Life-story books and related artifacts preserve aspects of a resident’s biography for staff and families [58, 59, 81, 90], while Memento surfaces known stories during care routines [70]. *CareWare* builds on this work by bringing resident knowledge into an ongoing interaction, where the resident’s present response can inform how that knowledge is interpreted and later recorded.

2.2 Sensemaking and Narrative in Care Work

Caregiving in long-term care (LTC) facilities regularly requires staff to respond to changing conditions, incomplete information, and goals that routine action cannot fully address [19, 27, 47]. Within Weick’s account, sensemaking describes how people organize these circumstances into an interpretation that allows them to act [54, 91–93]. This work involves both uncertainty, when relevant information is unavailable, and equivocality, when the available information supports several interpretations.

Interpretation is shaped by what a person already understands and by the social setting in which it occurs. The data-frame model describes how an existing account directs attention toward cues that may support or challenge it [44]. In dementia care, an expectation that a resident will not respond can make a slight movement easier to overlook, while interpreting every movement as intentional can exceed what the interaction supports. Situated sensemaking therefore requires caregivers to notice possible responses while continuing to revise their interpretation as the encounter develops.

Scaffolding provides a related account of how support can assist with this work. Wood et al. describe scaffolding as structuring a difficult activity without taking it over, while later research emphasizes that this support should remain contingent on the recipient’s needs and level of control [76, 88, 95]. In CareWare, guidance could direct attention or suggest how to continue, while the caregiver remained responsible for evaluating that guidance through the resident’s response. Sensemaking and scaffolding serve as analytical lenses in this study rather than psychological measures; following a suggestion does not establish that the caregiver accepted its interpretation or that the interpretation was correct. In professional care, continuing support may also remain useful after a caregiver has learned a technique because limited time, uneven access to information, and staffing constraints continue to shape each encounter.

Narrative provides one way to preserve and communicate the knowledge produced through these interpretations. Communities of practice develop shared repertoires of routines, artifacts, vocabulary, and stories [49, 94], while studies of collaborative work show how accounts of particular events retain contextual reasoning that formal instructions often omit [2, 11, 68]. Narrative can organize and communicate meaning, although its usefulness depends on how it is shared and taken up in practice [12, 87]. In dementia care, this knowledge is distributed across caregivers, families, specialists, and records, making its availability during an encounter a problem of both interpretation and infrastructure.

2.3 Field Research in Long-Term Dementia Care

HCI research in residential dementia care has often combined sustained observation, iterative prototyping, and case-based reporting to understand how technologies become part of everyday care. Prior studies have developed bespoke artifacts with residents and families [90], used long-term fieldwork to inform working prototypes [65], and left devices in care homes to examine how staff and residents incorporated them into existing routines [25]. This research has also considered mutual recognition, how people with dementia are positioned within HCI studies, and the ethical responsibilities that remain after a deployment ends [24, 32, 50].

Houben et al.’s study of Vita provides a particularly relevant methodological precedent. Professional caregivers used the artifact with residents with advanced dementia during 23 observed sessions across two care homes, followed by caregiver interviews and inductive analysis [33]. Other studies have used resident-level vignettes to present interactional evidence [56], examined longer-term use without treating an intervention as a clinical trial [6], and used LLM-generated prompts and images to prepare reminiscence materials before care sessions [79]. Our study follows this broader field-research tradition by identifying the residents and records that support each finding, reporting cases in which the

intervention provided limited support, and distinguishing observations about care interactions from claims of clinical effectiveness.

2.4 AI-Assisted Sensemaking During Care

Research on AI-assisted sensemaking examines how systems help people identify, organize, and compare information as they develop an understanding of a situation [53, 75, 78, 82]. Much of this work studies brief interactions between an individual and a system. Reviews of human–AI teaming have identified less attention to dynamic collaborative work and to systems that support several people over time [14, 67]. Longer deployments, such as the use of synthesized community stories during school rezoning, provide less common examples of AI-supported interpretation distributed across a community [69].

CareInsights and FITL addressed a related problem by treating shared resident knowledge as part of the continuing infrastructure of care. CareInsights brings together clinical, biographical, and interactional information for caregivers to consult [63], while FITL connects this information with family contributions and updates from the facility [64]. CareWare builds on this concern with distributed knowledge while changing when it becomes available, providing spoken guidance during music-based memory loss therapy. Resident profiles were assembled for the deployment using information from these earlier systems when available, although CareWare was not connected to their data stores during sessions.

Providing information during care also requires attention to how that information was produced and how it may later be revised. Pipek and Wulf describe infrastructuring as the continuing work of adapting technology in relation to existing practice [7, 74]. Documentation by frontline LTC staff is similarly a form of data work shaped by platform requirements, available time, and the circumstances in which a record is created [83]. Research on clinical AI has shown that expert-produced labels can preserve an outcome while omitting the interpretive work that led to it [51]. CareWare therefore draws on the moment-to-moment practice of an experienced dementia-care practitioner, including the cues she noticed and the reasoning behind her guidance, instead of relying on outcome labels alone.

Prior approaches to caregiver support include person-centered care training [13], tailored strategies for responding to behavioral symptoms [38], and step-by-step prompts for people living with dementia [60]. LLM-based systems have also supported caregivers and older adults through counseling, check-ins, training, and sensor-informed assistance [35, 40, 62, 72, 73, 98]. Most caregiver-facing examples respond to a request or follow a schedule rather than providing support during a caregiver–resident interaction.

Wearable systems, including smart glasses, have delivered in-situ feedback, social assistance, and memory support in other settings [55, 84, 89, 97, 100], while research on just-in-time adaptive interventions considers when support should be provided [66]. Timing is particularly consequential in dementia care because spoken guidance can compete with the resident’s expression or the caregiver’s attention. Systems must also accommodate differences in professional experience and address concerns about privacy, consent, and depersonalization [17, 46, 99]. CareWare examines how proactive smart-glasses guidance, expert oversight, and resident-specific information can be combined during professional care.

Related systems also provide useful models for evaluating this form of support. CareCall separates analysis of system operation from secondary analysis of interaction logs [35, 36], while MindfulDiary includes clinician review during pilot testing and deployment [41]. Proactive coaching systems have also been evaluated through editable representations of expert practice and analyses of system-initiated dialogue [1, 34]. Following these precedents, we treat expert oversight as part of the deployed CareWare system and report the provenance and completeness of the evidence used in our analysis.

2.5 Interpreting Care Records After Deployment

Few HCI studies examine documented practice after a prototype has been withdrawn [85]. Follow-up research shows that some practices may continue even as system use declines, although novelty, researcher presence, and reliance on local champions complicate interpretation [85]. Sustained person-centered care depends on continued practice, local ownership, and organizational routines [26]. Facility records provide one way to examine later activity, though these remain incomplete and are shaped by broader changes over time [86]. In this paper, we use records from the [AnonPartner] platform descriptively to examine documented coverage and continuity after CareWare was withdrawn.

3 Study Design and Methods

We conducted a design-led field study that combined formative observation, modeling of an experienced practitioner's approach, an expert-led Wizard-of-Oz pilot, and deployment in two LTC facilities. The analysis examines how CareWare entered music-based memory loss therapy sessions through resident-level cases, then draws on subsequent platform records to describe documented engagement after the system was withdrawn.

3.1 Facilities, Participants, and Ethics

We worked with [AnonPartner], which provides the tablet-based platform used for music-based memory loss therapy at both facilities. Its programs combine familiar music, imagery, narration, and conversation prompts that staff use while talking, singing, or sitting with a resident, after which they can document the session. Its documentation asks caregivers to rate the resident's mood before and after each session using a five-point Likert scale. Facility staff use changes in these ratings, together with session completion, as existing indicators of successful person-centered care.

Facility A had recently changed activities leadership, unreliable connectivity, short-notice scheduling, and limited access to resident records. Facility B had a more stable activities team, generally reliable connectivity, and a denser history of documented platform use. Both facilities ran a 24-hour, three-shift model with nursing leadership, unit managers, medication nurses, and certified nursing assistants; the activities staff who took part worked within that structure. Sessions occurred in resident rooms, hallways, and shared unit spaces, with additional site context provided in Appendix A.

Facility staff identified residents whom they considered difficult to engage and arranged sessions within existing schedules. The resulting purposive sample included residents with substantial communication impairments and residents who could converse but were socially isolated or rarely participated in activities. Some clinical records were incomplete or inaccessible to us, reflecting the reality of caregivers working at these facilities.

Identifiers carry the prefix F1 for Facility A and F2 for Facility B, followed by CR for a resident, CG for a staff member, or S for a session.

Table 1 lists the participating residents with the ages and scores reported in the study cases, and the participating staff by role. BIMS is the Brief Interview for Mental Status. F1-CR6's source describes a MoCA result as moderate without a numerical score; it cannot be converted to BIMS.

F1-CR3's earlier BIMS score was 12; the table uses the later pre-deployment score of 7. IDs have not been renumbered into date order.

The study received institutional review board approval at the authors' institution. Legally authorized representatives provided written consent for residents who could not consent independently, participating staff provided informed consent, and residents able to consent were approached directly. Caregivers continued to assess resident willingness

Table 1. Participants: care recipients with age, sex, and BIMS score, and staff by role; a dash means the field was not provided to us by the facility staff.

Resident	Age	Sex	BIMS	Staff	Role
<i>Facility A</i>					
F1-CR1	–	F	–	F1-CG1	Activities manager
F1-CR2	80	M	7	F1-CG2	Activities/recreation
F1-CR3	70	F	7	F1-CG3	Activities aide
F1-CR4	–	F	–	F1-CG4	Activities/recreation
F1-CR5	88	F	–	F1-CG5	Activities/recreation
F1-CR6	86	F	–	F1-CG6	Administrative staff
				F1-CG7 [†]	Unit nurse
<i>Facility B</i>					
F2-CR1	85	F	0	F2-CG1	Activities/recreation
F2-CR2	89	M	0	F2-CG2	Activities coordinator
F2-CR3	76	F	15	F2-CG3	Activities/recreation
F2-CR4	84	F	–	F2-CG4	Unit nurse
F2-CR5	72	F	14		
F2-CR6	95	F	0		
F2-CR7	95	F	3		
F2-CR8	75	F	0		
F2-CR9	58	F	13		
F2-CR10	87	F	0		
F2-CR11	73	F	15		

[†] Recruited; no archived session.

during sessions by changing activities, checking whether music should continue, and responding to fatigue, consistent with process-oriented approaches to consent [18, 32]. Pilot participants were debriefed about the practitioner’s role and could withdraw their data.

3.2 Formative Study and Modeling Expert Practice

Before developing CareWare, we spent three weeks observing care at both facilities, following the partner’s routine of three afternoon visits per week, and discussing one-to-one therapy with staff, administrators, and family members.

We also collaborated with an expert dementia-care practitioner employed by [AnonPartner] who had more than twenty years of experience in person-centered care coaching and music-based memory loss therapy, knew both facilities and many residents, and had contributed to the earlier CareInsights and FITL deployments. She conducted recorded sessions and reviewed them through retrospective talk-throughs, explaining the cues she noticed, the information she used, and why she acted or waited. This process was informed by the Critical Decision Method and Applied Cognitive Task Analysis [45, 61].

Three observations from this period shaped the design. Caregivers engaged residents with less advanced dementia more often than those with severe impairment, who tended to receive brief, perfunctory sessions; the quality of an interaction rose noticeably when a family member or the practitioner was present; and behavioral episodes both raised

the value of person-centered approaches and lowered caregivers' willingness to attempt them. Our expert partner described this pattern as follows:

"There are three main issues we face [this lack of attempting person-centered care]. First, unless an activity is explicitly mandated or financially incentivized, it often doesn't happen. Second, there is a broader societal undervaluing of people at the end of life, particularly those perceived as cognitively unaware, it's as if a person's value is determined solely by their ability to clearly communicate. Third, caregivers consistently feel pressed for time and thus naturally gravitate towards residents who seem easier to engage."

Drawing on this fieldwork, we collaborated with our partner caregiver to collect examples and guidelines for providing music-based memory loss therapy coaching to the particular caregivers at these facilities. For instance, this included content drawn from her talk-throughs where the practitioner described the cues she taught caregivers to look for ("If someone was not talking, can you push your hand on them? Did you notice when they put their hand on them, there was, like, a movement of the head?") and how she made a resident's response visible to the caregiver ("I'm asking the caregiver to count the music as they tap, 'one, two, three', then I say, 'you did it, did you see them tapping?' And when we get a positive reaction from the care recipient, it's then that they start to see that this feedback loop is possible"). The guidance described how to begin an interaction, respond to resident behavior, affirm an effective caregiver action, and document information for future care. This guidance was kept separate from resident profiles and included information about when to ask another caregiver or family member more familiar with the care recipient to retrieve this information. With this formulation, our guidance could both serve a caregiver in practice and, with some minor modifications, function as a system prompt for an agent, as illustrated in Figure 2.

3.3 CareWare Design and Deployment

3.3.1 Expert-Led Pilot. Before deploying the final agent, we evaluated a prototype with more direct human oversight through an expert-led Wizard-of-Oz pilot [15, 77]. The pilot mirrored the system shown in Figure 2, except that the expert performed the interpretive work later assigned to the agent. The caregiver used the same audio interface and ElevenLabs-generated voice [22] as in the final CareWare system, while the expert observed the interaction and composed guidance in real time (Figure 1). The pilot provided examples for refining the system prompt and showed that less experienced caregivers valued explicit suggestions and reassurance, whereas experienced caregivers preferred concise, resident-specific information and fewer interruptions when an interaction was progressing effectively.

The expert described her approach as giving caregivers "enough markers that they can replicate." This involved identifying what a caregiver was already doing effectively, reinforcing that practice, and addressing weaknesses constructively through guidance such as, "that's close, but try it this way." These practices informed CareWare's four coaching functions. *PREPARE* translated resident knowledge into questions that caregivers could use, often by offering the resident a choice. *OBSERVE* directed attention toward verbal and nonverbal indications that an interaction was progressing. *ENCOURAGE* identified what the caregiver had done effectively and explained why it mattered, rather than offering general praise. *DOCUMENT* allowed caregivers to record resident responses and preferences without leaving the interaction. The expert characterized the central challenges as recognizing the feedback available from a resident, knowing how to respond, and receiving sufficient encouragement to repeat effective practices.

Although the expert could respond directly to unfolding situations, the Wizard-of-Oz arrangement was not sustainable over extended periods. Watching the moving first-person stream from the Meta glasses caused motion sickness, which



Fig. 1. Screenshots from the deployment.

she described as feeling “seasick.” It was also difficult to interpret the interaction, retrieve relevant resident information, and compose guidance quickly enough to support the caregiver in real time.

3.3.2 Deployed System. In the deployed system, the practitioner served as a live observer while an LLM-based agent generated guidance (Figure 2). The GPT-4-based agent received a modified version of the guidebook used during the Wizard-of-Oz pilot. During each session, a CareInsights sub-agent responded to its queries by retrieving and synthesizing relevant biographical and clinical information from the resident’s available care record.

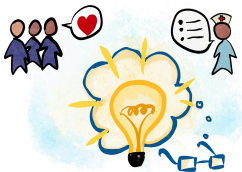
Caregivers heard guidance through open-ear speakers and could use a wake phrase to ask questions, record notes, or request a summary. The practitioner could revise or cancel suggestions before delivery and reviewed the recordings afterward. Her revisions primarily shortened guidance that was appropriate but too long for an ongoing interaction. Compared with the Wizard-of-Oz pilot, this arrangement reduced the burden of composing every prompt while preserving practitioner oversight. The practitioner also found that the agent generally reflected her coaching style and could produce more targeted guidance by combining her observations with retrieved resident information. The tablet recording was reviewed after each session but was not processed by CareWare in real time.

AI-Assisted Person-Centered Care



CareWare supports person-centered care through proactive coaching and question answering, helping a caregiver notice and act on resident-specific information and observations during an interaction.

The CareWare Agent



The CareWare agent combines the first-person stream with available resident information and a playbook modeled on expert practice. It can provide brief proactive coaching or answer questions addressed to "CareWare," while an expert observer reviews pending suggestions before delivery.

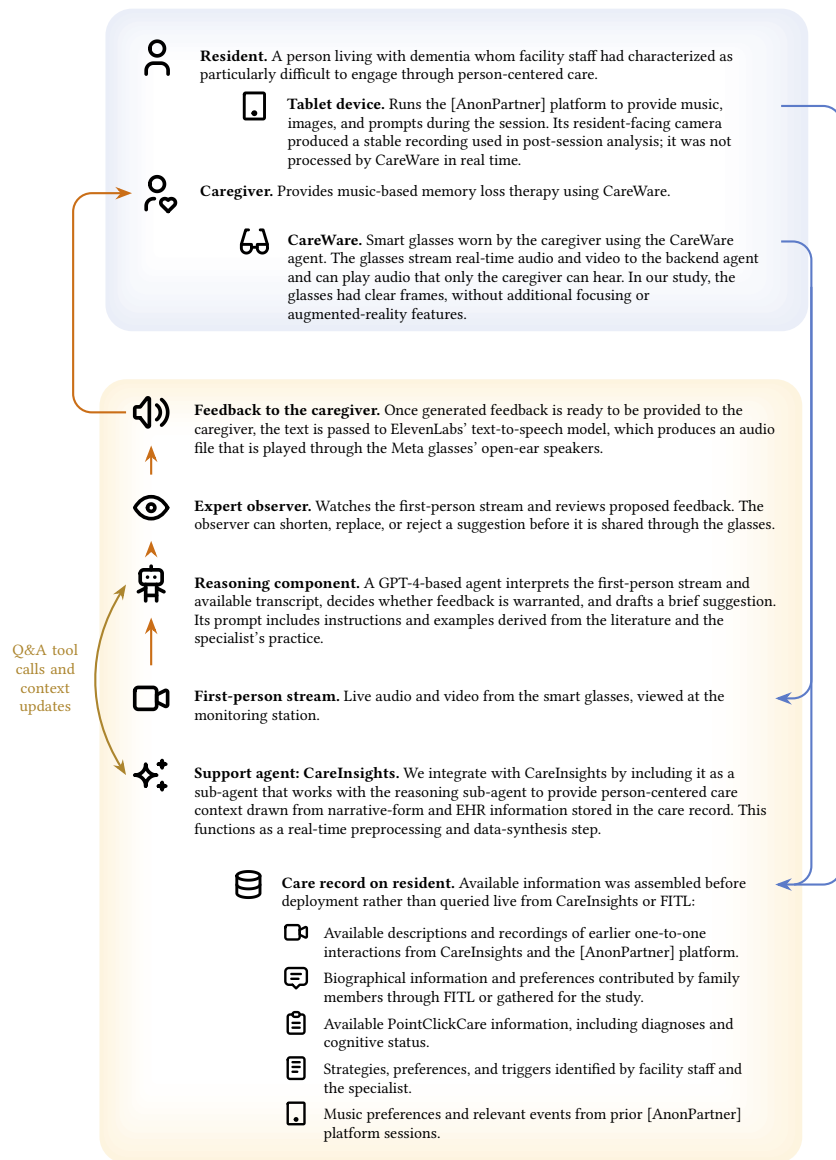


Fig. 2. System diagram of the deployed CareWare system.

3.4 Deployment Data

Sessions could produce a smart-glasses recording, tablet recording, transcript, annotations, and caregiver comments, although coverage was uneven. The annotated session logs are provided as supplementary material. Caregivers also took part in brief post-session interviews lasting 10 to 30 minutes, depending on their availability, and were invited to complete a baseline survey with nine caregiving self-efficacy items [5], two items on comfort with music-based activities [21], six technology-attitude items [16, 71], and workload (NASA-TLX) [29], with a post-deployment survey

Table 2. Deployment and follow-up data sources, with unit of analysis and coverage.

Source	Unit	Coverage	Produced by
Annotated deployment sessions	Speaker turn or video annotation	23 sessions (Facility A 10, Facility B 13); 3,373 archived rows, comprising 3,349 transcript rows and 24 video-annotation rows	Researchers; practitioner review of eight sessions and part of a ninth
Recorded caregiver interviews	Interview recording	Eight recordings (Facility A seven, Facility B one)	Onsite researcher
Caregiver surveys	Respondent	Seven baseline and four post-deployment responses; three caregivers completed both	Caregivers
Formative and deployment observations	Visit or session	Nine formative visits across three weeks; onsite observations during 23 deployment sessions	Onsite researcher
Resident care records	Resident	17 assembled records; four Facility A records contained no released clinical or biographical information	CareInsights, FITL, PointClickCare, facility staff, families, and the practitioner
Platform documentation	Resident-session entry	766 staff-documented entries (Facility A 39, Facility B 727), extending approximately eleven months after withdrawal	Facility staff

mirroring NASA-TLX for session-specific load. Only seven baseline and four post-deployment surveys were completed, however, owing to caregivers' time pressure and reluctance to sit down to complete even a short survey. Given this incompleteness, we consider the survey data only as context for the caregiver accounts and report on it in the vignettes where relevant. Table 2 summarizes the deployment and follow-up evidence.

3.5 Data Analysis

We used the resident case as the unit of qualitative analysis, examining how talk, gesture, gaze, music, and device use unfolded together [37]. For each resident, we assembled the available clinical and biographical context, session sequence, caregiver account, technical constraints, and follow-up documentation, then compared cases around how caregivers interpreted responses, used or disregarded coaching, and documented resident knowledge. Iterative analysis drew on practitioner reviews and field accounts and was informed by reflexive thematic analysis [8, 9].

We tested interpretations against cases that complicated them, including interactions sustained without assistance and instances in which experienced caregivers rejected redundant prompts. Missing audio was not treated as resident silence, and unresolved speaker identities or action labels were retained as uncertain or omitted. Themes represent patterns across cases rather than population-level frequencies.

The follow-up analysis read staff-documented platform histories as a trace of practice (Section 2.5) for approximately eleven months after CareWare was withdrawn, including 727 Facility B resident-sessions across the periods before, during, and after deployment. Mood change in these records is the caregiver's own survey response, not an observer rating.

AI-assisted tools. AI tools were used in the development of CareWare and later data analysis. During the writing process, they were used for adversarial review, fact and grammar checking, and stylistic revision.

4 Findings

Across the resident cases, CareWare shaped how caregivers interpreted responses, selected actions, and documented resident knowledge, although its contribution varied with caregiver experience, technical availability, and the interaction already underway. We organize the findings around four cross-case themes. Appendix B provides the complete resident vignettes, and the supplementary logs preserve the underlying session records.

4.1 Interpreting Subtle and Nonverbal Resident Responses

CareWare was most consequential when a resident's response was present but difficult to interpret. F2-CR2 did not speak in the available transcript, but the practitioner's review annotations describe smiles, eye contact, and head movements as F2-CG2 tried prompts about outdoor activities and compared songs. When CareWare drew attention to his eye contact and confirmed a note about his smile, the caregiver repeated the observation to him and treated it as information worth preserving. She later described the prompts as making the interaction feel "lighter" because she did not need to generate each question herself, while wondering whether the glasses had made her more attentive to residents' signs (Appendix B.8).

F2-CR4 similarly had no transcribed speech, although video annotations record nodding, blinking, and lifting the head. After F2-CG1 asked the resident to blink twice to indicate a preference, two blinks were recorded, and later questions about whether to rest or continue were answered with nods (Appendix B.10). Together, the transcript and video show why caregivers may need support attending to several possible response channels when speech provides an incomplete account of participation.

The two camera perspectives made this limitation visible across cases. The tablet usually preserved a stable view of the resident, while the smart glasses showed the caregiver's changing visual field, including screens, coworkers, and other demands that competed for attention. Neither view was sufficient alone: the glasses often lost the resident's face when the caregiver turned away, whereas the tablet could not show what the caregiver was positioned to notice. CareWare used only the glasses stream during deployment, suggesting that a more automated system would need complementary resident- and caregiver-centered inputs to interpret a response and determine whether assistance was warranted.

In other cases, CareWare affirmed an interpretation the caregiver had already made. During F1-S10, F1-CG2 noticed that F1-CR6 was humming before the assistant repeated the observation and the caregiver requested a note (Appendix B.6). Experienced caregivers also identified fatigue, emotional changes, and resident preferences without prompting, making the system most useful when it reinforced or documented their judgment rather than attempting to replace it.

Caregivers valued guidance that recognized when further prompting was unnecessary. With F2-CR7, who was in the late stages of dementia, CareWare affirmed the caregiver's decision to hold the resident's hand, sing, and attend to her comfort rather than continue asking questions (Appendix B.13). F1-CG2 similarly valued confirmation that F1-CR6 could listen quietly or rest. Emotional responses required greater caution: when F1-CR2 became tearful, CareWare characterized emotion as positive, whereas a later session with F2-CR5 showed the caregiver directly asking whether a song associated with a deceased friend should be skipped (Appendices B.2 and B.11). Across these cases, useful coaching supported continued interpretation rather than assigning a definitive meaning to resident behavior.

4.2 Caregiver Use of Coaching and Documentation Support

Caregivers evaluated coaching in relation to the work already underway. F1-CG4 sustained a conversation about dancing with F1-CR3 during a session with little assistant input and later explained that she disregarded a suggestion because she was "already doing that." F1-CG1 similarly ignored advice that repeated a topic she had already discussed (Appendix B.3). Their objections concerned timing and redundancy rather than opposition to coaching. The practitioner had anticipated this: "I knew she [F1-CG4] would not pay attention to anything coming through her ear because she was already an expert. Trying to coach empowerment the same way as with younger caregivers, [you know] how it was perceived? Patronizing."

Experienced caregivers still valued feedback when it reflected the interaction they were conducting. F1-CG1 described such feedback as useful because a coworker could not evaluate an encounter she had not observed, while F1-CG3 treated praise as confirmation that her approach was appropriate. At the same time, caregivers often connected resident knowledge to action without system support: F1-CG3 selected a program for F1-CR5 while avoiding a topic known to cause distress, and F2-CR3 selected music and developed conversational topics herself (Appendices B.5 and B.9). CareWare therefore supplemented existing expertise rather than accounting for every successful interaction.

Spoken documentation was especially prominent in three Facility B sessions, where caregivers asked CareWare to record music preferences, responses to images, comfort, work history, and other details without leaving the interaction (Appendices B.7, B.11, and B.15). Caregivers described these notes as resources for colleagues, including aides and nurses who could use a resident's work history to begin later conversations.

The system did not reliably transfer these observations into shared profiles. F2-CR1's later profile omitted preferences documented during her session, F2-CR5's profile omitted the profession she discussed, and information already available for F1-CR6 had not reached the profile used by CareWare. A prior observation may have resurfaced during F1-CR2's session, although unresolved speaker labels prevent verification of automated retrieval (Appendix B.2). Together, these cases distinguish recording an observation from making it available to another caregiver.

Caregivers also treated CareWare as a point-of-work assistant. F2-CG3 asked it to identify the next song and stop the recording during F2-S3, while F1-CG2 asked it to skip a song during F1-S10. In F2-S6, F2-CG2 used phrases supplied by CareWare to communicate with F2-CR6 in Spanish and later described the exchange as helpful (Appendix B.12). Because the system was not integrated with the tablet and the translations were not independently validated, these requests identify unmet support needs rather than evaluated CareWare capabilities.

4.3 Technical and Organizational Conditions of Use

When connected and properly fitted, CareWare delivered guidance without requiring a handheld interface. Caregivers commonly expressed surprise when they first put on the glasses and heard the assistant's voice; most described the experience positively while also remarking that it felt unusual or strange. F2-CG1 described the voice as "soothing, not obnoxious like a GPS" and valued spoken note-taking, although she also mentioned eye fatigue. Caregivers spoke of the assistant more as a partner than as a voice assistant or a search tool; less experienced staff treated it as a coach, experienced staff as an unobtrusive aide that offered reminders and took notes, and an experienced Facility A caregiver valued that it seemed to be learning from her: the practitioner had sent a prompt while the caregiver was letting the resident enjoy a song, then, seeing the resident's enjoyment once the caregiver turned toward her, withdrew it ("you did it right, I did it wrong"). Several caregivers had worried during onboarding that they would not be able to operate the glasses or follow the study procedure, and said afterward that the sessions had left them more confident with technology generally; without the structure of a study, some might not have tried such a tool on their own. Caregivers interviewed after sessions said they would use the glasses again. Staff at Facility A, including F1-CG7, who declined to take part in sessions but agreed to an interview, described AI in care as probably inevitable, and older staff compared it with the earlier transition to electronic health records, in which colleagues either adapted or were "forced out" of the profession. This use depended on an onsite researcher who configured and maintained the glasses and on a practitioner who monitored the stream, meaning that caregivers' experience of the interface cannot be separated from the labor supporting it.

Technical failures had direct consequences for care delivery. At Facility A, unstable connections made guidance unavailable or difficult to hear, and the glasses did not fit over F1-CG5's prescription glasses, leading the researcher to

conduct F1-S7. In F2-S8, the glasses channel carries nothing after the ninth minute, but the tablet recording shows the caregiver continuing while the resident responded through movements and a thumbs-up (Appendix B.14). In F2-S2, the caregiver removed the glasses because she believed they had stopped, although later prompts remained in the system record. These cases show that generated guidance was not necessarily heard and that silence was difficult to distinguish from disconnection.

The facilities also shaped where and when CareWare could be used. Shared rooms, mealtimes, interruptions, short-notice scheduling, and missing profiles limited preparation and interaction time. These constraints were part of the deployment environment rather than problems that could be addressed through prompt design alone.

Recording raised a parallel set of concerns, and caregivers distinguished risks to residents from risks to workers. Resident concerns included non-consenting bystanders in communal areas and permanent records of distress, disrobing, or comments made without the ability to contextualize them, which caregivers wanted kept confidential even from family members, partly for legal reasons; F1-CG2 said she would not use the glasses “in the dining room where other residents would be exposed.” Worker concerns centered on recordings collected for coaching later being used for evaluation or discipline. The practitioner, for her part, described “feeling physically sick” at being part of recording equipment in “intimate, personal settings,” and discomfort with recordings of such care moving beyond the room in which it occurred. Recording equipment of this kind would ordinarily not be permitted at either facility. These concerns identify separate limits on where recording occurs, who may review it, how long it is retained, and what it may be used for, which we take up in the discussion.

4.4 Documented Coverage and Continuity After Withdrawal

We did not observe a consistent change in caregivers’ patterns of providing care as a result of the intervention, either in how often residents received documented sessions or in how effective caregivers rated those sessions. Figure 3 shows every staff-documented session for the study residents before, during, and after the deployment. Coverage widened while the study was present, with seven residents first appearing in staff-documented sessions during the window (five of six at Facility A, and F2-CR5 and F2-CR11 at Facility B), and then returned to each facility’s earlier pattern once the study ended. At Facility A, four of the five newly documented residents had no later session; at Facility B, residents who were already being seen continued to be seen, at a somewhat lower rate, and documentation became less complete, with paired caregiver mood ratings present in 78% of sessions before deployment and 47% afterward. Among the sessions that retained paired ratings, caregiver-rated mood change after withdrawal was not lower than before deployment, but with far fewer sessions rated, the record does not show a change in the effectiveness of care in either direction. Residents who received attention during the study because it was there did not, for the most part, continue to receive it once the study ended.

5 Discussion

Person-centered dementia care requires caregivers to interpret incomplete and sometimes ambiguous evidence while deciding how to proceed, a process central to recognizing and sustaining personhood [10, 20, 42]. Caregivers must construct an actionable account of a resident’s behavior under time pressure [47, 92]. Grounded in the data-frame model of sensemaking [44], a caregiver’s existing expectations heavily influence which cues they notice and how they act on them. Residents with limited verbal communication are therefore especially vulnerable to having their actions interpreted as an absence of preference, interest, or capacity. When staff expect little response, subtle expressions of participation

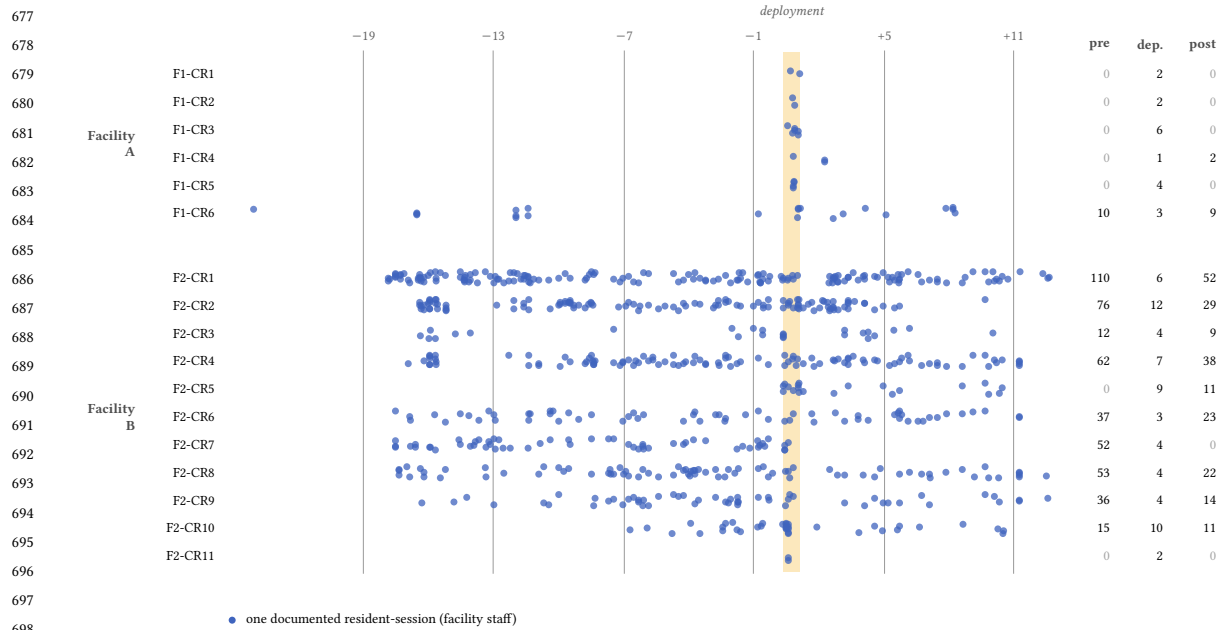


Fig. 3. Every staff-documented session for the 17 study residents before, during (shaded), and after the deployment, one dot per session on an axis of months relative to the start of deployment, with per-resident counts for the three periods at right.

become easier to overlook. CareWare scaffolded situated sensemaking by modifying this initial understanding, directing attention toward resident-specific knowledge and possible interpretations during the encounter.

Perhaps one concrete way to understand this support is as approximating the role often performed by family members and experienced practitioners, who advocate for residents by contributing biographical knowledge, noticing subtle physical responses, and helping other caregivers interpret what they observe. These individuals fill gaps in another caregiver's understanding, ensuring the resident is more fully understood and noticed. CareWare extended parts of this support into encounters where those people could not be present, providing a limited form of embedded advocacy. Delivering this assistance through smart glasses provided a specific operational advantage: by sharing the caregiver's first-person vantage point, the system gained a proxy for their attention. This access allowed the system to balance the risk of being overly intrusive against the need for timely support, introducing observations and possible interpretations exactly when the caregiver's attention allowed for it. Importantly, within this role CareWare did not represent residents or determine what their behavior meant; rather, it supported sensemaking by making possible interpretations available without resolving ambiguity on the caregiver's behalf.

Although CareWare assisted staff in providing music-based memory loss therapy, subsequent documentation suggests that this guidance did not alter the organizational conditions determining whether later sessions occurred. CareWare may therefore be better suited to providing continuing care infrastructure than temporary training that can eventually be withdrawn [74]. Staff turnover, limited time, and uneven transfer of resident knowledge repeatedly create a need for support during care. AI-assisted sensemaking cannot compensate for inadequate staffing, scheduling, or institutional recognition of person-centered care. Longer-term deployments would need to be accompanied by practices that allocate time for this work and recognize it as part of care rather than an additional responsibility.

Routine use would also increase the recording and collection of sensitive information about residents and workers [17, 46]. Such systems require limits on recording and reuse, clear provenance for assembled information, and procedures for obtaining consent in shared facility environments. Interpretations of resident behavior must remain provisional rather than entering care records as established clinical facts. Facilities must also prevent audio and video collected to support care from being repurposed for staff evaluation or performance monitoring. These protections are necessary for AI-assisted sensemaking to function safely as part of long-term care.

Finally, CareWare’s use of smart glasses also points to a possible contribution to future assistive robotics. Research has shown that human video can provide actionable information for robot learning and that egocentric recordings from smart glasses can support imitation learning when paired with hand tracking, localization, and robot demonstrations [4, 39]. Research on robot caregiving likewise relies on expert demonstrations, but uses substantially richer data that include RGB-D video, pose and gaze tracking, tactile sensing, and action annotations [52]. CareWare’s recordings might contribute situated examples of how practitioners approach residents, direct their attention, and respond to nonverbal behavior.

6 Limitations

The study involved two facilities, uneven caregiver exposure, substantial practitioner and researcher involvement, incomplete records, and follow-up data that represent documented CareInsights activity rather than all care. The study does not establish clinical efficacy or a causal effect on subsequent caregiving practice.

7 Conclusion

CareWare explored how proactive smart-glasses coaching could bring resident knowledge into music-based memory loss therapy while caregivers interpreted subtle and sometimes nonverbal responses. The findings show that AI-assisted sensemaking should support, rather than settle, caregivers’ interpretations and should remain responsive to evidence from the caregiver–resident interaction. Extending family and expert support also requires resident knowledge to be maintained, returned, and governed within organizational conditions that make person-centered care possible.

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A Facilities, Participants, and Evidence Coverage

A.1 Facility Context

Both sites were long-term care facilities using the [AnonPartner] platform for music-based memory loss therapy, including one-to-one encounters and routine group programming. They had also participated in earlier work on resident information and family contributions. CareWare entered these existing relationships and practices. The

following descriptions concern the conditions of this deployment rather than representative characteristics of all facilities of their type.

Facility A.. The activities department was under a newly appointed manager. Sessions were often arranged at short notice, and unreliable network connectivity affected live coaching. An onsite researcher assisted with setup and troubleshooting. Participating staff included activities workers and an administrative staff member with no previous experience delivering the platform activity. Their accounts include valuing encouragement, finding advice redundant, and needing more experience with the equipment before feeling comfortable.

Facility B.. Facility B had an established activities team and generally adequate connectivity. Its platform history was substantially denser than Facility A's. Residents included people who spoke little, people whose articulation was difficult to capture, and people who could converse but tended to remain in their rooms. Staff knew several residents well; a unit nurse also participated despite having no previous experience conducting this engagement activity.

B Resident Vignettes

B.1 Vignette: F1-CR1

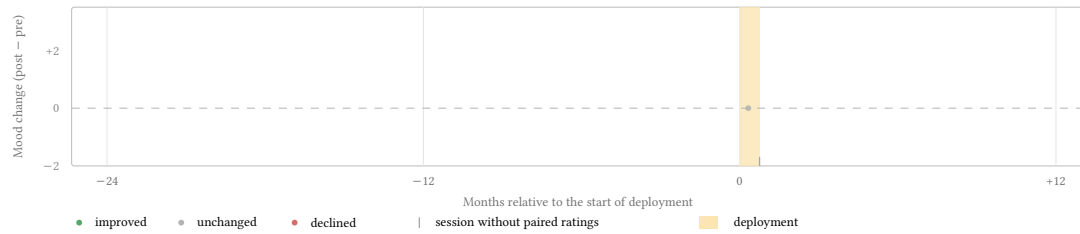


Fig. 4. Staff-documented platform sessions for F1-CR1; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident and session context. The platform profile contained a name and unit but no preferences or guidance that could support program selection. No earlier engagement session was documented on the platform.

F1-CG6 conducted F1-S1. She had not used the platform before and had been invited to participate at short notice. A nurse manager remained in the room while the onsite researcher attempted to establish the glasses connection from outside the doorway.

Interaction during the connection failure. The assistance was intermittent. The log contains an introduction, suggestions, and encouragement from CareWare, interspersed with F1-CG6's conversation with F1-CR1. Resident speech is present in the tablet record despite the difficulties with the glasses. Conversation continued while much of the intended assistance was unavailable.

The recording also continued after the engagement activity ended. In this later discussion, F1-CG6 asked practical questions about who would be trained, whether a department could take responsibility for the tool, and how she could obtain her own login. This post-session discussion is excluded from the engagement account.

Caregiver experience with the wearable. F1-CG6's post-study responses combined perceived usefulness with difficulty using the equipment. She reported limited confidence with the glasses and substantial learning effort, while agreeing

that the system could make her work easier and improve the care she delivered. Her request for access was similarly concrete: she wanted to be set up as a platform user rather than continue obtaining access through the activities manager.

Access, training, and a working connection remained separate requirements. Her later session with F1-CR3 also involved a connection problem, but on that occasion she reported hearing nothing from the assistant (Appendix B.3).

Afterwards. A further platform session was documented for F1-CR1 on the last day of the deployment window by a staff member outside the study. The platform record shows no later entry and no added profile information.

F1-CG6 wanted to use the system again, but problems with connectivity, training, and responsibility for operation remained unresolved.

B.2 Vignette: F1-CR2

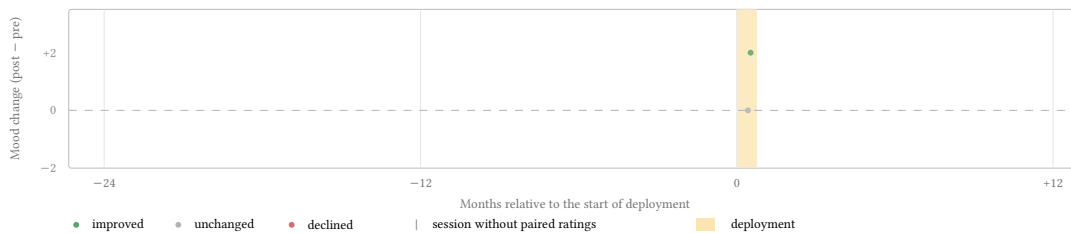


Fig. 5. Staff-documented platform sessions for F1-CR2; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident context and prior care. F1-CR2 was a man with dementia. His profile listed jazz and soft music, cars, nature, wildlife, and a home he had owned in [anonymized place]. It also described his tendency to move around and advised staff against forcing him to remain seated. No platform engagement was documented before the deployment. During an earlier session with F1-CG1, a song was marked as a favorite and information about wandering was recorded. That session, F1-S2, has no coded glasses log.

Modified wearable setup. F1-CG5, an experienced activities caregiver, could not fit the device over the prescription glasses she needed to see. The onsite researcher therefore wore the glasses and led the interaction while she remained in the room.

Our session notes describe F1-CR2 initially declining the activity, then joining after the offer changed to a choice of programs and an image attracted his attention. The session subsequently returned to the outdoors, walking, and his former home. At approximately twelve minutes, the recorded talk referred to his previous session with F1-CG1 and to the description of him as a wanderer. This is a trace of earlier information being brought into the current interaction.

Response to emotional reminiscence. During *Time in a Bottle*, F1-CR2 talked about the forest, land in [anonymized place], and autumn colors. The practitioner’s review describes him becoming tearful. CareWare said, “Caregiver, emotion is a good thing.” The researcher continued listening, and F1-CR2 described a viewpoint on the property, an old farmhouse, heating with wood, and cooking with his mother.

The conversation continued around an emotional memory. The assistant’s statement was broader than the evidence available to it. As guidance, such reassurance would need to remain responsive to the person’s wishes and signs of discomfort.

Caregiver interpretation. F1-CG5 understood the experience partly as an opportunity to learn: “it’s teaching me more how to go about doing this program. I’m really able to learn more about the residents.” When asked about the encouragement, she said, “It made me feel good.” She connected that response to her years in the role and to wanting more ways of working with residents whose communication had changed. She also returned to this resident: “And to see F1-CR2 light up the way he did today.”

Afterwards. The platform record shows no later session for F1-CR2 after F1-S7.

The case brings together two forms of support that should remain distinct: introducing information from a previous encounter and helping the person wearing the glasses respond to an emotionally charged moment.

B.3 Vignette: F1-CR3



Fig. 6. Staff-documented platform sessions for F1-CR3; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident context and session sequence. F1-CR3 was a woman with dementia. Her profile stated that she had played guitar and preferred religious and gospel music. No earlier platform engagement was documented. She participated with F1-CG2 in F1-S3, F1-CG4 in F1-S8, and F1-CG1 and F1-CG6 in F1-S9 and F1-S11 on the last day of glasses sessions. The sessions used programs about fire, remembrance, and work rather than programs explicitly organized around the recorded gospel preference.

Music and conversation across sessions. F1-S3 took place with F1-CR3 in a wheelchair in a quiet hallway. The practitioner’s review describes singing and answers to the caregiver’s questions; the platform record also contains a song marked as a favorite. Asked what helped her connect, F1-CG2 emphasized the material: “there were certain songs she responded to, in a more positive way.” She described the glasses as reminding her to interject rather than leave all the work to the program. The music and the live assistance were consequently different parts of her account.

In F1-S8, the assistant contributed little while F1-CG4 developed a conversation about dancing. She asked about dancing when young, going out with friends, preferred kinds of dance, and clothes. The tablet recording stopped partway through, so later resident answers are not directly recoverable from that channel. Some are reflected in the caregiver’s next question or restatement.

Interview evidence where recordings were unavailable. The tablet recordings for F1-S9 and F1-S11 were unavailable. In her same-day interview about F1-S9, F1-CG1 recalled using pictures of animals to develop a conversation about childhood pets. Her account included goats, pigs, and a rabbit whose name the resident could partly recall. She also described talking about wheat fields.

F1-CG6 likewise described participation in F1-S11 that the glasses transcript could not capture: “she was also responsive and able to communicate, and she was singing along with the songs, she knew the songs, she recognized the songs.” Yet she reported hearing no assistant output during that session. Comparing it with her earlier experience, she said, “But this time nothing, I didn’t hear anything.” A sparse recording and unavailable assistance did not mean that no encounter took place.

Caregiver differences in evaluating support. F1-CG4 did not identify a useful contribution from the glasses. Asked what helped her connect, she said, “I would say nothing.” Her example of redundant guidance was specific: “she suggested like to talk more about the pictures and stuff, but I was already doing that.” This judgment concerned the timing and added value of support, not an inability to conduct the session.

F1-CG1 valued encouragement: “You need to have that good feedback, because sometimes when you’re doing things you don’t know if you’re doing the right thing.” She also described letting a prompt pass when its topic had already been discussed. Positive feedback and unnecessary suggestions could therefore coexist within her assessment.

Across sessions. The platform record contains staff-documented engagement with F1-CR3 beyond these four glasses sessions.

B.4 Vignette: F1-CR4

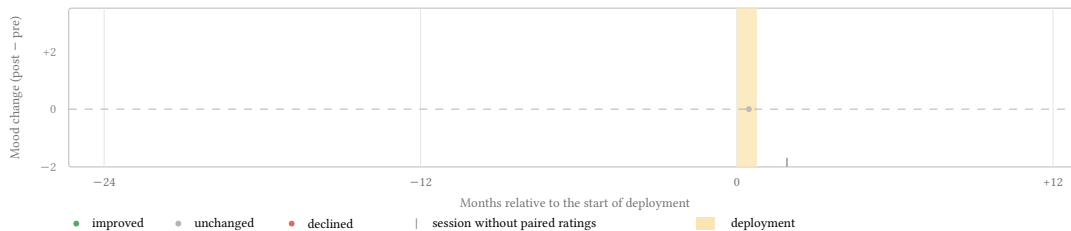


Fig. 7. Staff-documented platform sessions for F1-CR4; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident and relational context. The platform profile supplied no preference or language information. The case materials describe a recent move into the facility and Vietnamese as her language. There was no earlier documented platform session.

In F1-S4, F1-CG3 and F1-CR4 sat in the resident’s room, with F1-CR4 in a chair beside the bed.

Image-supported conversation. The caregiver connected the images to experiences of beaches and travel, offering some of her own recollections as she asked questions. In one exchange she checked whether F1-CR4 understood what she was saying. Later they discussed an image of pyramids and its possible location. They worked to sustain a shared topic without translation support from CareWare.

The transcript was produced using an English transcription model and cannot securely distinguish English speech from Vietnamese, so this account does not reproduce uncertain resident quotations.

Caregiver assessment. In the post-session interview, F1-CG3 attributed her questions chiefly to the briefing she had received before using the device. She did not identify a particular live prompt as responsible for connecting with F1-CR4. She nevertheless described the suggestions as understandable and selected notes and quick tips when asked which functions she would retain.

She distinguished what the briefing helped her do from what the glasses added during use.

Afterwards. Audio alignment and language coverage limit close reconstruction. Two later sessions were documented on a single day about five weeks after the deployment, both by F1-CG4 and both without a post-session mood rating; nothing further appears in the record. The profile remained incomplete in the available account.

The case shows a caregiver drawing on shared images and her own recollections to sustain a topic.

B.5 Vignette: F1-CR5



Fig. 8. Staff-documented platform sessions for F1-CR5; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident context and session conditions. F1-CR5 was a woman with dementia. Her platform profile was partial, listing English as her preferred language. Her husband lived in another facility. According to F1-CG3, she sometimes cried because she missed him.

No earlier engagement session was documented on the platform. F1-CG4 conducted F1-S5 while F1-CR5 was in bed, muting the television before beginning. F1-CG3 conducted F1-S6 the following day, late in the day, with the resident in a wheelchair. The two encounters consequently differed in caregiver, position, time, and program as well as in how the assistance was used.

Caregiver-selected session purpose. F1-CG3 explained her choice of a program aimed at lifting mood through what she already knew: “she sometimes cries that she wanted to see her husband and her husband is at a different facility.” Her account of an earlier conversation about him was hesitant: “one time I was like, oops, I asked her about her husband but I feel like I shouldn’t.”

She described F1-S6 as a comfortable interaction in which the resident appeared happy. Her reasoning was not contained in the partial profile.

System confirmation of caregiver judgment. F1-CG3 described the prompts mainly as feedback on her own questions: “the prompts were just telling me... I got good questions. Just like I did a good job, that’s all.” Asked whether that

When discussing notes, she said she would record material that might “kind of remind her of things that she did before and she was happy about it.” She also regarded difficult topics as information another caregiver might need.

CareWare sometimes confirmed the approach F1-CG3 was already taking. Her explanation of what she would document also extended beyond favored songs to difficult topics, provided that a record preserved the context rather than turning one encounter into a permanent rule.

Figure 1 is a scatter plot showing mood change (post - pre) on the y-axis (ranging from -2 to +2) against months relative to the start of deployment on the x-axis (ranging from -24 to +12). A vertical dashed line at month 0 indicates the deployment date. A shaded orange region from month 0 to 1 represents the deployment period. Data points are categorized as improved (green), unchanged (grey), or declined (red). Most points are at 0 mood change, with one improved point at month -10 and one improved point at month 1.

Resident context and prior platform use. F1-CR6 was a woman in the late stages of dementia. Her platform profile listed music, cooking, and reading; it also contained topics such as choir participation, secretarial work, and [anonymized place]. Favorite songs and a history of platform engagement predated the deployment. This information was more extensive than the resident information transferred into the study record.

F1-CG2 described a change in the resident's ordinary social contact: "she used to be very social. She used to be out in the dining room all the time, engaging with other people, and I think at this point she's spending more and more time in her room, which kind of isolates her." F1-S10 took place privately in that room on the last day of glasses sessions, with F1-CG2 using the glasses for a second time.

Support for action and restraint. The opening involved fitting the glasses, adjusting the tablet, and finding the volume. F1-CG2 later said the resident had not talked much or answered many questions, but appeared to enjoy the music, company, and interaction.

CareWare's feedback included permission to let the resident listen and to stop if she seemed tired. The caregiver recalled: "It did tell me, you know, it's good that you're just letting her enjoy the music at times too. So that was a good affirmation." She also remembered the advice, "it did give the insight, you know, it seems like she's tired. Maybe give it a rest." In her account, useful guidance could reduce the pressure to ask another question.

At 24:20 in the annotated log, F1-CG2 said, “I hear you humming.” CareWare subsequently observed, “It is nice that the care recipient is humming.” The caregiver then requested a note. The assistant affirmed a response the caregiver had already noticed.

Caregiver judgment, documentation, and privacy. F1-CG2 remained explicit about her own authority: “if it was something I wouldn’t have felt comfortable with, I would have ignored it... I’ve worked with this population long enough and F1-CR6, I kind of know, so if I wasn’t sure I would have trusted my instincts.” She identified a colleague on the unit as someone to whom useful observations could be passed, but did not consider this particular session to have produced new information that needed reporting.

On privacy, she said: “No, because we were in her room alone... I wouldn’t use it in the dining room where other residents would be exposed.”

Afterwards. The tablet recording was unavailable, leaving no adequate resident audio channel. The platform record continues after the deployment.

For F1-CG2, a shared activity could remain worthwhile without extensive speech: “This gives us something to do together, but even if she’s not able to really comment much or complete a task, it can still be a fruitful experience.” She also wanted more practice before using the equipment independently. She retained her own discretion while still needing practical help with the device.

B.7 Vignette: F2-CR1



Fig. 10. Staff-documented platform sessions for F2-CR1; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident context and prior care. F2-CR1 was a woman with dementia. She spent much of her time in bed and found group programming difficult. Her profile listed country, bluegrass, and soft rock; hand holding and hand massage as comfort measures; and music, animals, and her children as topics. It cautioned that noise could be overstimulating. Staff had documented 110 platform engagement sessions before the deployment, so this was not a first attempt to spend time with her.

F2-CG1 knew the resident and conducted F2-S1 at her bedside on the first day of the deployment. The glasses microphone did not adequately capture F2-CR1, and no tablet recording could be aligned with the session. Her side of the encounter is therefore described through what the caregiver reported and the questions she asked next.

Prompt use and note creation. When CareWare suggested asking about swimming, F2-CG1 developed the question into a choice about the kind of water the resident liked, then requested a note about swimming in a lazy river. The caregiver subsequently reported that the resident did not like *Lazy River* and asked for another recommendation. CareWare proposed *Ain’t No Mountain High Enough*, after which F2-CG1 reported a more favorable response to the song and images.

The caregiver continued asking questions of her own while requesting notes. These concerned hand holding during music, the feeling of being present in an image, and going dancing to country music. The transcript records the questions, the caregiver's interpretation of replies, and spoken confirmations.

Documentation for subsequent care. F2-CG1 used the assistant as someone to whom she could speak observations while remaining with the resident. At the close, CareWare offered a spoken summary of the notes. Her immediate response emphasized both functions: it made notes during the encounter and offered suggestions. In a subsequent session she again identified hands-free note taking as useful because it reduced the need to type afterward.

Our notes also record that she questioned the BIMS result and suggested reassessment. This shows her reconsidering the resident's expressive possibilities.

Afterwards. Staff documented 52 further platform sessions after the deployment. The available profile did not incorporate the new details described in F2-S1, including lazy rivers and line dancing. This discrepancy shows that spoken confirmation and later profile content were not equivalent.

A general music preference became several possibilities another caregiver might try. Capturing them usefully would require retaining who interpreted the response and under what conditions.

B.8 Vignette: F2-CR2

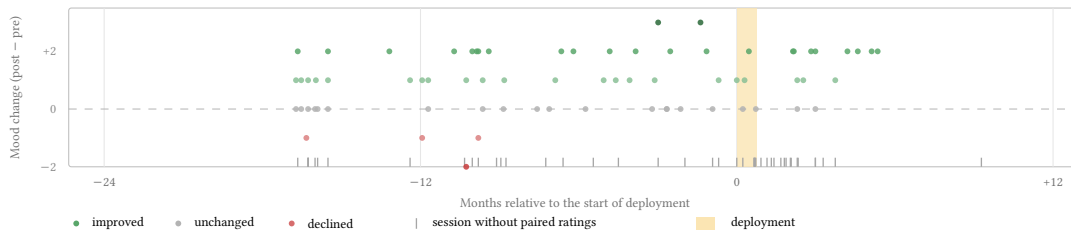


Fig. 11. Staff-documented platform sessions for F2-CR2; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident context and prior care. F2-CR2 was a man with vascular dementia. His record recommended a fidget board and cautioned against giving him objects that he might place in his mouth. His profile offered a different kind of information: he had worked as an engineer, enjoyed golf, and preferred country, bluegrass, and soft rock. By the time of the study, he did not communicate through speech.

Staff had documented 76 platform engagement sessions before the deployment. The difficulty was therefore not simply an absence of contact. It concerned the cues and conversational possibilities available to a caregiver when the resident could not supply a spoken answer.

Caregiver and session context. F2-CG2 was an experienced activities caregiver. F2-S2, on the first day of the deployment, was her first session with the glasses. It took place in a small communal room during a busy mealtime period, with F2-CR2 seated in a wheelchair. Other residents entered, a colleague tried to get her attention, and food arrived during the activity. She later recalled having to indicate that she could not talk to her colleague. A nurse also explained that the room could not remain closed to others.

Her familiarity with him was evident in the opening conversation, where she described his interests and the caution about objects he might put in his mouth.

Observation of nonverbal engagement. No resident speech was recoverable in the transcript. The video annotations and caregiver's descriptions instead record smiles, head movements, eye contact, and a hand gesture. CareWare connected some of these visible actions to possible topics. Early in the session it drew attention to a head turn while proposing a question about the outdoors. It also repeated the caution, "Be careful not to have papers too close to him." That warning echoed the caregiver's own opening remarks.

The caregiver tried questions about camping, outdoor places, food, and music, watching for a response. Some supplied topics did not lead to a response she could interpret. The system did not make the meaning of a head movement certain. It suggested something she could ask next, after which the resident's response, or lack of an interpretable response, shaped the exchange.

The first-person view helped the practitioner comment on what was happening within the caregiver's field of attention. CareWare said, "F2-CR2 had nice eye contact with you." Later it commented on his lifted head. Such observations linked encouragement to a visible event rather than treating the absence of speech as the absence of participation.

Documenting a nonverbal response. Just under ten minutes into the session, CareWare announced, "Note made. F2-CR2 smiled." F2-CG2 responded, "Oh, I can ask her to note things," and told the resident, "I noted that I got a smile from you." She recognized the note function through its use and incorporated that recognition into her talk with him.

The exchange treats a smile as an event worth retaining. Whether the observation became a durable, shared record is not established.

Caregiver reflection. In her post-study interview, F2-CG2 described the prompts as making her feel "lighter" and creating "less pressure." She explained that the support "was just there. It was just faster than my brain goes. ... You're focusing on them and not necessarily trying to focus on what's next. It did that part for me." Her account concerns the work of choosing a next move while continuing to attend to the person in front of her.

She also returned to eye contact with F2-CR2:

"With [F2-CR2] making more eye contact with me. Now he knows my voice. So yesterday when I was doing a program, like a small sensory program, I looked up from my paper and he was just making perfect eye contact with me."

She described being "more aware of signs and stuff of the residents that they're making." They show what she regarded as worth noticing after the deployment.

Afterwards. Near the end of F2-S2, F2-CG2 removed the glasses, believing that they had stopped working. CareWare continued speaking after removal, so those final outputs were not assistance she received. The session also ended within the constraints of the shared room. The system could offer support during the encounter but could not reserve the space or protect her time from competing demands.

Staff documented 12 platform sessions during the deployment and 29 afterward, with the last entry eight months after withdrawal. In this session, gaze, posture, and a smile became grounds for a next question, feedback to the caregiver, and a request to retain what had happened.

B.9 Vignette: F2-CR3

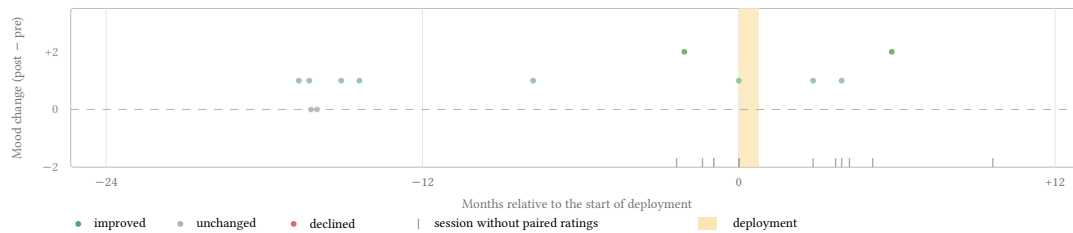


Fig. 12. Staff-documented platform sessions for F2-CR3; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident and session context. F2-CR3 was a woman with a dementia diagnosis. Her profile described singing along, reading *National Geographic*, and talking about family and the news. Staff had documented 12 platform engagement sessions before the deployment.

F2-CG3 conducted the session and was unfamiliar with the tablet platform. The practitioner's review describes changing material after the resident initially declined the music, then returning to songs. A nurse's visit to the roommate interrupted the encounter; those exchanges are distinct from the interaction analyzed here.

Resident initiation and conversational direction. The session moved between music, images, and F2-CR3's own topics. She asked, "Can you find the Beatles on there?" When conversation turned to dogs, she asked the caregiver, "Do you guys have a dog?" She then described a cousin's gas station and a dog kept there. These were contributions to the direction of the conversation, not merely answers to a sequence of prompts.

Other parts of the account concerned where she grew up, her husband's work, military service, travel, and familiar performers. Images as well as songs supplied openings. The caregiver followed those openings with questions; the assistant could propose an additional topic without being the source of everything subsequently discussed.

The practitioner's account also describes revising a prompt after seeing that a quiet interval involved the resident listening to the song. In that instance, a pause did not require another question. The episode illustrates the possibility of correcting the timing of guidance through observation.

Recording. The tablet was stopped and restarted, producing more than one recording for the encounter. Part of the assistant's audio was recovered from the tablet channel rather than the glasses recording. These conditions limit precise timing claims, while the resident's speech still documents topics she introduced.

No post-study interview or survey was available for F2-CG3.

Afterwards. Staff recorded nine platform sessions after the deployment, with entries extending nine months after withdrawal.

This case differs from those centered on subtle nonverbal responses. The resident's conversational contribution was readily evident in the available audio. Assistance here concerned sustaining and widening an exchange while leaving space for her to redirect it.

B.10 Vignette: F2-CR4

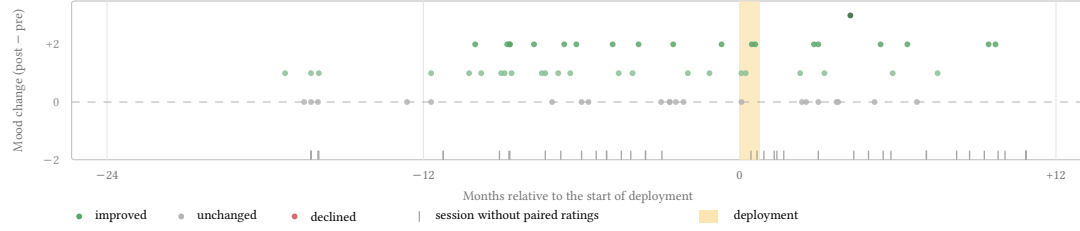


Fig. 13. Staff-documented platform sessions for F2-CR4; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident and session context. F2-CR4 was a woman with dementia. Her hearing was limited. The profile described music, animal imagery, and hand massage as useful, advised giving her space when agitated, and cautioned against discussing home. Staff had documented 62 platform engagement sessions before the deployment.

F2-CG1 conducted F2-S4 with the resident seated in a wheelchair. The caregiver asked questions, sang, held her hand, and operated the tablet. The absence of transcribed resident speech could make this look like an encounter conducted without replies. The video annotations give a different account.

Recognition of gestural responses. The annotations describe nodding in response to an offer of hand holding, turning toward the caregiver's singing, and lifting the head toward an image. CareWare commented on these actions as the interaction continued. When F2-CG1 proposed blinking twice as one way to answer, the annotation records two blinks. The caregiver then requested a note about nonverbal cues, and the assistant supplied a spoken confirmation.

At the close, the caregiver asked whether F2-CR4 wanted to rest and whether she wanted another program. The annotations record a negative head response to the first and an affirmative one to the second. Those responses concern the encounter itself, not just the content on screen. They show the caregiver offering ways to express a preference and treating small movements as possible answers.

Not every movement has an unambiguous meaning. A nod observed after a question is evidence of a response in that sequence; establishing a reliable communication convention would require repeated checking.

System feedback. CareWare repeatedly coupled its observations with encouragement. This made what the practitioner could see available to the caregiver while she was asking questions and watching the resident. The caregiver's assessment of the glasses was favorable but practical: she found the voice "soothing, not obnoxious like a GPS" but reported some eye fatigue, and she valued speaking notes instead of typing them afterward.

Afterwards. Staff recorded 38 platform sessions after the deployment. The available profile did not add the session's account of communicating through gestures.

Resident speech alone would omit the recorded nods, blinks, and head movements. The annotations preserve how F2-CG1 sought and interpreted responses.

B.11 Vignette: F2-CR5

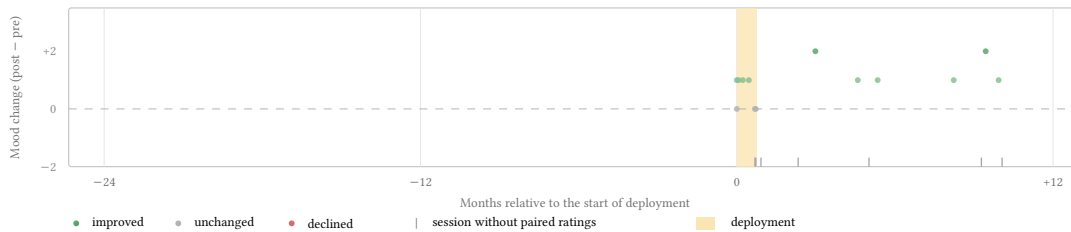


Fig. 14. Staff-documented platform sessions for F2-CR5; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident and caregiver context. F2-CR5 was a woman with dementia. Her eyesight was limited, and her profile listed big band, classical, jazz, and easy listening. It also described images and hand massage as helpful at difficult times of day. There was no earlier documented platform engagement.

F2-CG4, who had not previously facilitated this kind of program, conducted F2-S5 early in the deployment. F2-CG2 conducted F2-S13 on the last day of glasses sessions using material about work.

Initiating conversation. Early in F2-S5, CareWare suggested drawing attention to an image. F2-CG4 asked, “F2-CR5, look at the screen. Do you see the campfire?” The video annotation records the resident lifting her head. F2-CR5 subsequently supplied opinions, questions, and recollections: “Not too good, but I enjoy the music”; “Is that song about the Navajo Indians?”; and “It took me a long time to learn how to swim.”

The encounter was not uniformly cheerful. F2-CG4 reported that a song brought sadness associated with losing a friend. She then asked, “Do you want the song skipped, F2-CR5? Do you want us to change the song? If it upsets you, I don’t want to upset you.” Her subsequent note request reported that the resident did not want the song skipped. Continued listening thus involved a check with the resident, not just the assistant’s later reassurance about bittersweet memories.

Biographical knowledge for later care. F2-CG4 repeatedly requested notes during F2-S5. In F2-S13, F2-CG2 also learned something she had not previously known: the resident had worked as a social worker. The glasses log records the topic and a request to note it. The caregiver's later account added the long hours and the young people with whom the resident had worked. It also preserved a qualified assessment of the work, rather than assuming that a former occupation was a happy topic.

No tablet recording was available for F2-S13. The detail of that conversation therefore rests on the caregiver's recorded talk and interview, not an independently audible account from F2-CR5.

Caregiver effort and intended note audience. F2-CG4 reported that the task required effort while also rating the system favorably and expressing willingness to use it again. A demanding first encounter could still be considered useful.

F2-CG2 explained where information about the resident's work might matter: "it would give them something to talk about with her either while maybe they're doing cares or giving her meds." She envisaged aides and nurses using an observation to begin another conversation and then sharing what they learned.

Afterwards. Staff documented nine platform sessions during the deployment and eleven afterward. The available profile did not add the resident’s occupation. Her documented engagement continued.

Across these two sessions, the proposed value of a note was relational and specific: it could give a different caregiver something to ask about during routine care.

B.12 Vignette: F2-CR6

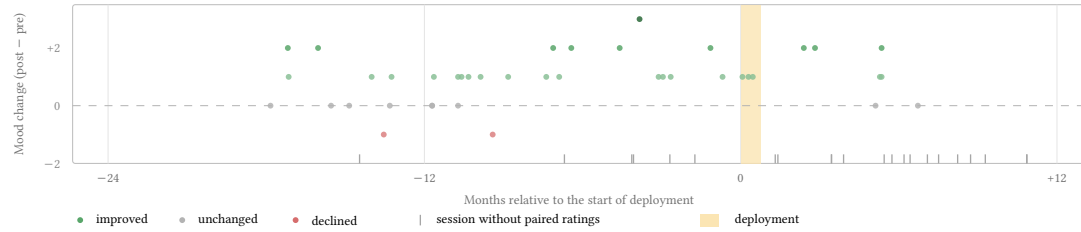


Fig. 15. Staff-documented platform sessions for F2-CR6; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident context and language difference. F2-CR6 was a woman with Alzheimer’s disease. She was receiving hospice care and spent much of her time in bed. Her profile listed traditional Spanish and Puerto Rican music. She primarily spoke Spanish, which F2-CG2 did not speak. Staff had documented 37 platform engagement sessions before the deployment.

F2-CG2 conducted F2-S6 at the bedside. Early in the session she told CareWare that the resident spoke mostly Spanish. The assistant began supplying phrases for her to repeat, extending its role from guidance about an activity into language assistance.

Use of translated phrases. The assistant supplied phrases intended to ask about music and singing. The caregiver requested repetition and tried to pronounce them, then sang to the resident. The log records her reporting an affirmative reply to one question; video annotations also describe gestures and speech that the microphone did not capture intelligibly.

When the caregiver expressed affection and referred to their longstanding acquaintance, the video annotation records a nod. Later the resident addressed her as *mija*. CareWare revised an earlier interpretation of a term of endearment. This study did not validate the translations.

Toward the end, F2-CR6 was described in the practitioner’s review as calling out. F2-CG2 checked what she needed and went to get water. This response to a possible need came from the caregiver rather than a translation prompt.

Caregiver interpretation. In her later interview, F2-CG2 selected the correction as a memorable part of using the system. She recalled the assistant acknowledging an earlier interpretation and offering another, then said, “So that aspect helps me connect with them better.” An acknowledged correction may be reassuring even when the revised answer has not been verified.

No tablet recording was available, and the glasses channel did not provide an adequate account of the resident’s Spanish speech.

Afterwards. Staff recorded 23 platform sessions after the deployment. The profile still lacked a completed language field.

A caregiver wanted help understanding and addressing a resident whose language she did not share. Her use exposes a boundary: a conversational assistant can be treated as a translator.

B.13 Vignette: F2-CR7

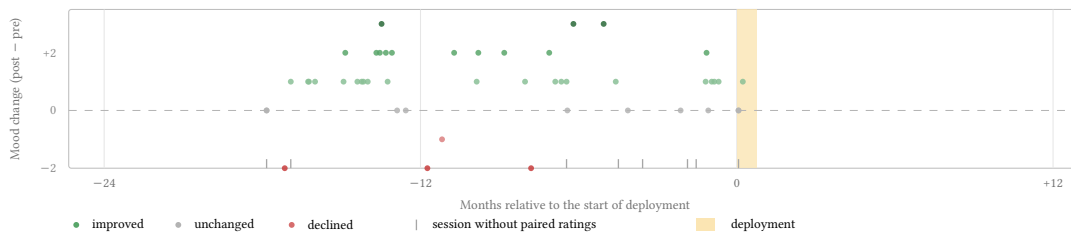


Fig. 16. Staff-documented platform sessions for F2-CR7; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident and session context. F2-CR7 was a woman with Alzheimer's disease. She was in the late stages of dementia. Her profile described a background in farming, interests in gardening, animals, baking, and painting, and familiar popular music. It also identified hand holding, hair brushing, and reading aloud as possible comfort measures, with a caution about loud noise. Staff had documented 52 platform sessions before the deployment.

F2-CG2 conducted F2-S7 with the resident in bed and positioned toward the program. The available record contains little directly recoverable resident speech.

Care without continued questioning. CareWare commented on the caregiver's hand holding, agreed with lowering the volume, and affirmed sitting quietly with the resident. The caregiver also sang. Those actions allowed the interaction to proceed without making a spoken answer the condition for continuing to spend time together.

The assistant drew on the farming background to suggest topics about seasons, farm work, and baking. At one point it said, "Her eyes open slightly as you were describing the farm." That is an observation made through the remote view. It gave the caregiver a reason to attend to a small change.

Suggestions alternated with recognition of what the caregiver was already doing.

Caregiver account. F2-CG2 did not leave a session-specific retrospective account; her general comments about reduced pressure concern her experience across residents.

Afterwards. Staff recorded four platform sessions during the deployment, with the last entry a week into the deployment window. No later platform session appears in the record, and the resident's subsequent circumstances were not available.

Assistance here accompanied company and comfort the caregiver was already providing.

B.14 Vignette: F2-CR8

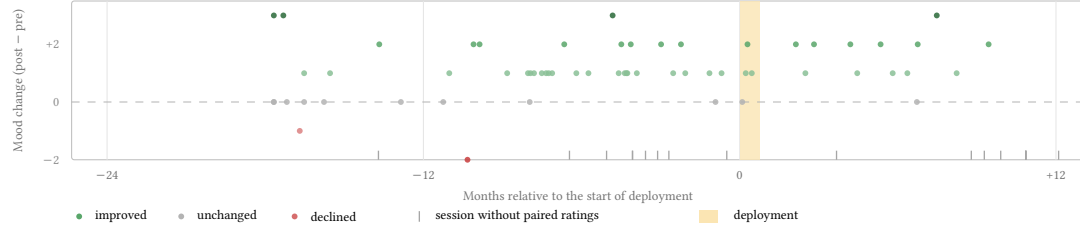


Fig. 17. Staff-documented platform sessions for F2-CR8; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident and spatial context. F2-CR8 was a woman with Alzheimer's disease. Her profile listed pop music, bingo, paint by numbers, and topics involving children and animals. It also advised caution in positioning her head. She spent much of her time in bed and used small movements and facial changes to communicate. Staff had documented 53 platform engagement sessions before the deployment.

F2-CG2 conducted F2-S8 in a shared room. The roommate was present and some recorded talk was addressed to that person. Those exchanges are excluded from this resident's account.

Nonverbal responses and volume adjustment. CareWare suggested asking where F2-CR8 might like to camp. The caregiver offered a choice between places out west and the mountains in [anonymized place]. The video annotation records a lifted finger, interpreted within that exchange as selecting out west, followed by a slight facial change at the caregiver's joke.

When asked whether the music was too loud, F2-CR8 shook her head. Near the close, the caregiver reviewed songs using thumbs up or thumbs down, and the annotation records a thumbs up for *You Are My Sunshine*. These responses concern possible preferences about the activity as well as its subject matter. They are absent from a conventional speech transcript even though they affected what the caregiver understood.

Failure without a clear system signal. The glasses channel carries nothing after the ninth minute of a session that continued for about twenty minutes, and the connection did not recover. The annotated log identifies attempted messages that did not reach F2-CG2. She continued with the resident and the tablet, without a clear indication distinguishing a technical failure from an assistant choosing not to speak.

The later gestures therefore cannot be attributed to ongoing live assistance. They were sought by the caregiver and recovered in the video review. Degraded tablet audio and the presence of a roommate further complicate the transcript.

Afterwards. Staff recorded 22 platform sessions after the deployment.

Attention to nonverbal responses changes the account of what F2-CR8 contributed, but that attention was not continuously supplied by CareWare. After the connection failed, interaction depended on the caregiver continuing to ask, wait, and interpret.

B.15 Vignette: F2-CR9

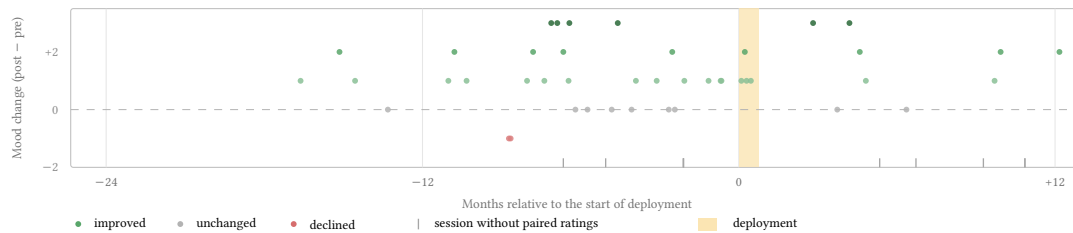


Fig. 18. Staff-documented platform sessions for F2-CR9; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident and session context. F2-CR9’s available record listed depression; no dementia diagnosis was recorded in the materials available to us. She was from [anonymized place], spent much of her time in bed, and disliked large groups. Her profile listed upbeat Spanish music, gardening, reading, cooking, and animal visits. Staff had documented 36 platform engagement sessions before the deployment.

F2-CG1 conducted F2-S9 with the resident in bed. F2-CR9 spoke, but her articulation was difficult to follow in the recordings. The annotations also describe arm movements, gestures, and nonspeech sounds.

Interpretation of speech and movement. During an early song, the video annotation describes F2-CR9 moving her arms to the music. CareWare commented, “Nice dancing together therapist.” The caregiver later used the images to propose scenes involving trees, food, and outdoor places. The resident contributed remarks about cooking, travel, sunsets, and animals. At one point she asked, “Can you see the animals?” The question shifted the direction of attention from the caregiver’s prompts to something the resident wanted her to notice.

F2-CG1 requested notes about preferences she understood from the exchange, including sunsets and butterflies. Some resident responses were clearer in the video and adjacent caregiver talk than in the transcript.

Documentation and clarification. The caregiver used the glasses repeatedly to request notes. The record contains requests without corresponding confirmations, so the existence of a request cannot be treated as proof that it was captured successfully. The assistant also had difficulty pronouncing the resident’s name, adding friction to a conversation in which hearing and understanding were already difficult.

F2-CG1’s favorable general assessment of the note function helps explain why she used it here.

Afterwards. Staff recorded 14 platform sessions after the deployment. Nine of them were by F2-CG1, so some continuity of staffing was present. The available profile did not add an account of how to interpret the resident’s communication.

B.16 Vignette: F2-CR10

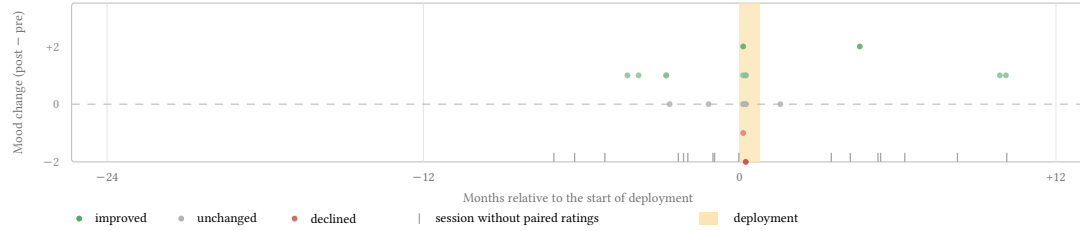


Fig. 19. Staff-documented platform sessions for F2-CR10; the height of a dot is the change in the caregiver’s five-point rating of the resident’s mood from before to after that session.

Resident context and recorded preferences. F2-CR10 was a woman with dementia. Her profile described dancing and moving her shoulders to music, alongside practical comfort measures such as snacks, drinks, and nail care. It cautioned against raising one’s voice because this could be upsetting. Staff had documented 15 platform sessions before the deployment.

Both activities caregivers worked with her on the same day: F2-CG1 in F2-S10 and F2-CG2 in F2-S12.

Dancing and music in F2-S10. Early in F2-S10, CareWare suggested asking whether F2-CR10 had enjoyed going out dancing. F2-CG1 asked whether she knew how to waltz, and the resident answered with talk about dancers and about telling her mother that she loved music. The caregiver then requested a note that F2-CR10 enjoys dancing and music, and CareWare read the note back. When a later suggestion about cake flavors drew the reply “I like everything that I like,” the caregiver had that recorded as well. Near the close, CareWare observed that F2-CR10 liked to share stories with her, and the caregiver told the resident she was a good listener.

Distress and redirection in F2-S12. F2-S12 began differently. A few minutes in, F2-CR10 said “I’m not happy” several times and spoke about her mother. F2-CG2 asked what was wrong, and CareWare suggested pausing the music and calming her. The caregiver changed to a program of water scenes, asked about kayaking, fishing, and swimming in lakes, and CareWare commented, “Great redirecting.” Later it suggested lowering the screen to the resident’s eye level, after which the resident asked, “Is that better?” Toward the end, the caregiver checked whether she was “all better now,” and the resident said she was feeling all right. Neither session received the manual video review available for the more closely annotated Facility B cases, and neither caregiver left a retrospective account specifically about these sessions.

Afterwards. The platform contains ten engagement entries during the deployment and eleven afterward. The deployment entries include both favorable and unfavorable changes in caregiver-rated mood.

B.17 Vignette: F2-CR11

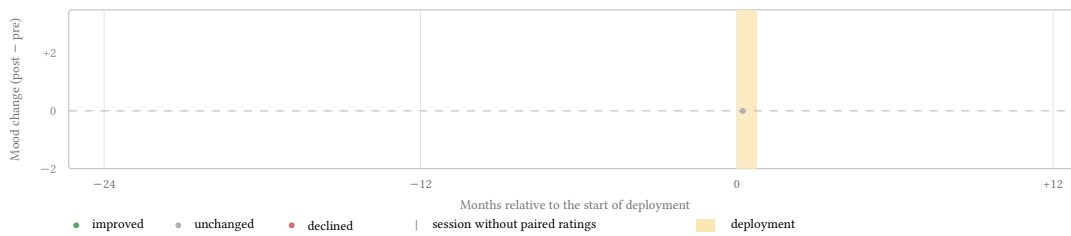


Fig. 20. Staff-documented platform sessions for F2-CR11; the height of a dot is the change in the caregiver's five-point rating of the resident's mood from before to after that session.

Resident context and available evidence. F2-CR11 was a woman with dementia. She was receiving hospice care. Her profile listed music, movies, and hand massage, identified the Beatles and Frank Sinatra as preferences, and cautioned against loud music and a loud tone of voice. No platform engagement was documented before the deployment.

Two platform sessions were documented on the same day. One is associated with the short coded glasses record, F2-S11, with F2-CG2.

Observed response and connection failure. At the start of the extract, F2-CG2 identified a smile and CareWare supplied a note confirmation. The caregiver asked whether the resident wanted the music turned off, then discussed putting on Frank Sinatra. Shortly afterward she said, "If I can get the Internet to work on this thing." CareWare also repeated the recorded preferences for Frank Sinatra and the Beatles.

The sequence establishes an attempt to attend to the resident's response and adjust the material while encountering a technical problem.

Recording and caregiver context. No tablet recording was available, and no resident speech was securely recoverable from the glasses transcript.

F2-CG2 left no session-specific interview account. The caregiver rated one session as not effective and the other as only somewhat effective, and mood was unchanged in both.

Afterwards. No later platform session appears in the record, and the resident's subsequent circumstances were not available.

The reported smile, attempted music selection, and connection problem are concrete traces of an encounter.