ElderCare Plain-Language AI: Reducing Cognitive BurdeninMedical Instruction Understanding for Older Adults

1. Introduction

After medical appointments, older adults often receive text-heavy instructions about medication, follow-ups, and precautions. Misunderstanding them may cause late medication, missed appointments, or failure to notice warning symptoms. Therefore, ElderCare Plain-Language AI / Care Routine Organizer turns doctors' instructions into simple language, clear steps, visual cues, and schedules. It does not replace doctors, but helps older adults follow medical advice at home.

1.1 Opening Case

An older patient received written instructions while leaving the clinic. He should take a pill after breakfast and one more before sleep, and then get an appointment in two weeks. When the patient leaves the office, they are left unsure of the order, timing and warning signs. This reveals that the problem is not just reading this instruction, but also turning this into a safe daily action.

2. Social Good Problem

Older adults may find written medical instructions difficult to follow in daily life. This can lead to mistakes such as taking medicine incorrectly, missing doses, missing appointments, or not reacting to serious symptoms. This is a social good problem because it affects patient safety, older adults' independence, and family caregiving burden. Clearer instructions may help older adults manage care with less confusion and less reliance on family members.

3. Target Users and Usage Context

The main users are older adults who need to manage medication, follow-ups, and daily care after a medical visit. Family members and caregivers are secondary users because they may help explain and monitor these tasks.

The system is used at home after the appointment. Users can upload or enter the doctor's written instructions, and the system reorganizes them into easier steps and reminders. If users are unsure or symptoms get worse, they should still contact a medical professional.

4. Literature Review

4.1 Older Adults and Medical Instruction Comprehension

Research into post-visit medical instructions has found that patients do not always fully understand medical instructions. Further, there is a discrepancy in understanding, particularly around discharge instructions and medication instructions. In a review of studies and meta-analysis regarding older adults' understanding of emergency department discharge instructions, Haimovich et al. (2024) found unique differences in older patients' understanding of the various instructions, with medication instructions and return precautions being crucial components. The issue is not whether patients were given the instructions but whether they understood and could correctly apply them after leaving the clinical setting.

The post-visit understanding and implementation is key for this project as this is precisely what ElderCare Plain-Language AI focuses on. Older adults must manage their medication, schedule follow-up appointments, and monitor their symptoms using instructions provided to them after returning home. If they are not clear about these instructions, care may be compromised. As

a result, the literature affirms the project's basic premise: post-visit instructions should be easier to understand, remember, and follow, rather than simply complete.

4.2 Health Literacy and Medication Adherence

The ability to clearly understand and use the medical information provided to them. For elderly individuals, this is especially true of medication adherence, where taking medication often requires remembering the time, dose, frequency, and precautions. When patients are willing to cooperate, but they don't get the message, they may go wrong in practice.

According to Schönfeld et al. (2021), health-literate older adults generally enjoy good adherence to medication. According to Wang et al. (2023), older adults with multiple health conditions demonstrate a higher likelihood of correct adherence to medication instructions when they have greater medication literacy. Furthermore, self-efficacy also enables these individuals to feel more confident about their medication use.

The studies show that medical instructions should be written more clearly. Simple language, clear steps, and timely reminders will make it easier for users of ElderCare Plain-Language AI to understand what they need to do. In this way, this system not only helps users to comprehend information but also enables elderly persons to convert medical advice into action.

4.3 Plain Language, Visual Cues, and Time-Based Information

When carrying out research or developing a health intervention, it is essential to specify the information that the intervention seeks to impart. Apart from this, the health information must be understandable and applicable to its target audience. According to the CDC (2025), users must be able to use the health information provided by a health program in an easy manner. It is

particularly important for elderly people as they have to take care of their own medications, follow-up appointments, symptoms, etc., by themselves after a medical visit.

Besides language itself, visual cues and timing are also important. According to a study by Sharko et al (2022), patients can comprehend their medication information better with visual representations of dosage and time. Different healthcare tasks are time-sensitive. For example, taking a medication after a meal, taking a medication at night, following up with an appointment in a few days, or contacting a doctor when symptoms change. As a result, it is easier to follow information that is organized in schedules, reminder cards or checklists.

ElderCare's Plain Language AI uses simple language, visuals, and timelines for this very reason. The system is not designed to produce new medical advice but rather to condense the instructions already provided by doctors in a more memorable and easier way. It will help older adults remember what to do next after a medical appointment with greater clarity.

5. Core System Functions

Medication adherence among older adults with chronic conditions has long been a global public health challenge, and polypharmacy further increases the difficulty of following treatment plans (Marcum & Gellad, 2012). ElderCare Plain-Language AI is a multi-platform medical support system designed for chronic disease management among older adults. It mainly supports older adults after they return home from the hospital, helping them understand medical instructions, take medication regularly, remember follow-up appointments, and coordinate care with caregivers. Based on the

doctor's instructions, the system provides cognitive support through translation, organization, reminders, and feedback, making complex medical information clearer, more specific, and easier to act on. As can be seen in Figure 1, a digital interface is integrated with a concrete device to create an integrated support system for home-based care.

Figure 1.

(a) The four digital interfaces of the system: Doctor App, Guardian App, Dashboard, and Device Screen

(b) Product concept of the Care Routine Organizer

The system consists of the Doctor App, Guardian App, Dashboard, Device Screen (Figure 1a), and the Care Routine Organizer smart pillbox (Figure 1b). The Doctor App is used to enter medical instructions, review AI-simplified content, and monitor medication-taking records. The Guardian App supports caregivers in organizing care tasks, preparing medication, and recording updates. The Dashboard

and Device Screen are designed for older adults, displaying the current time, the next medication task, and reminder messages. When it is time to take medication, the device translates the medication plan into actual instructions, such as opening the right compartment, providing prompts, and confirming when a task is complete.

The system forms a continuous information feedback loop (Figure 2). The doctor first enters the original medical instructions. The AI then translates them into plain, action-oriented language. After the doctor double checks and confirms the simplified version, it is synchronized to the Guardian App, Dashboard, and smart pillbox. Then, once the older adult completes the medication task according to the prompts, the execution information of each version of the instructions is sent back to the caregiver and doctor in order to support follow up care and future clinical decisions.

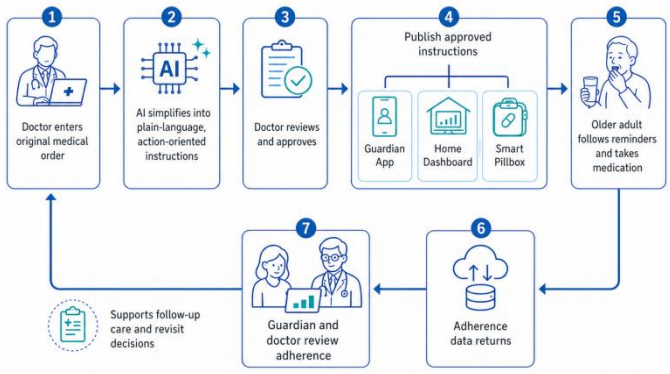


Figure 2. Medical Instruction Feedback Loop

To summarize the above points, the core value of ElderCare Plain-Language AI is not to allow AI to provide independent medical advice but to help doctor-confirmed medical advice enter home-care and assist the execution of prescribed actions more effectively. It helps medical advice translate “what the doctor said” into “what the older adult should do now,” “how the caregiver can assist” and “what execution

results the doctors can review later.” Thus, we can build a clearer connection between home-based care and clinical follow-up.

5.1 Doctor App: Information Source and Review Hub

The system’s information source, the Doctor App, acts as the central review hub for AI-generated content (Figure 3). The use of the Doctor App isn’t to have the AI replace doctors, but to insert a medical-instruction simplification and review step into the doctor’s work flow to make sure that the information being released to senior adults and their caregivers is accurate, safe, simple to understand, and well explained.

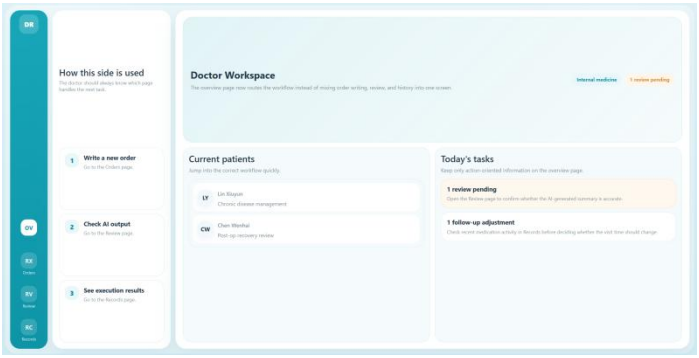


Figure 3. Doctor Workspace overview.

In addition, the original medical orders and clinical notes entered by the doctor, such as medication names, doses, medication time, subsequent arrangements, warning symptoms, etc., will be stored on the Electronic Order Editor page (Figure 4). This ensures that information used for later processing comes from a series of complete clinical judgement.

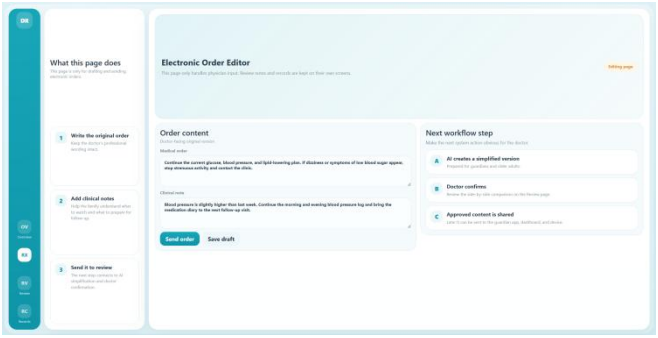


Figure 4. Electronic Order Editor.

When the medical orders are submitted, the system regenerates its interpretation into a clearer and more action-oriented version and presents it on the AI Order Review page as shown in the image (Figure 5). Doctors are required to compare the original medical orders with the regenerated version produced by the system and check the validity of information regarding the dosage, timing, warning symptoms, and follow-up requirements, as well as check for any omitted or misinterpreted information. The content approved through the “Approve and Publish” action will be synced with the guardian application, home dashboard, and smart pillbox. If the content is not accurate enough, the doctor can choose to edit it before publishing, or send it back to be regenerated.

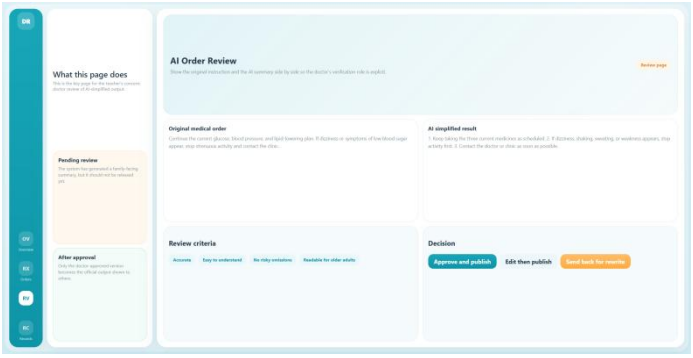


Figure 5. AI Order Review page.

On the Clinical and Adherence Records page, doctors can view the patient’s adherence between visits, such as medication status, missed doses, and summarisation

of clinical observations (Figure 6). These help understand whether the patient has adhered to the medical orders before the follow-up visit and whether the care plan should have the following adjustments. Thus, the doctor-facing system creates the safe workflow of order entry, AI to simplify, doctor review and publishing, as well as access to the adherence data. This design clearly limited the role by the AI: only the information reorganisation and simplification, whereas the final medical decision-making and publishing authority are with the doctors or clinical staff.

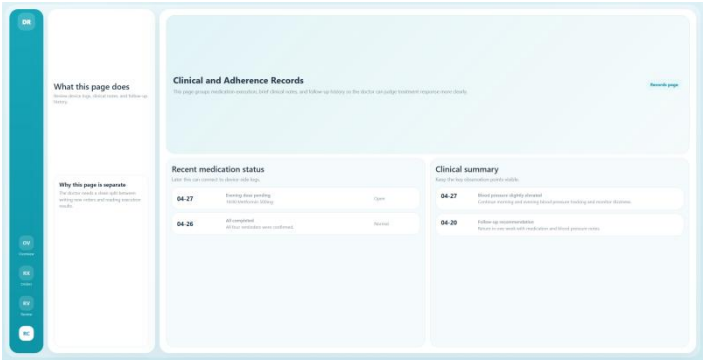


Figure 6. Clinical and Adherence Records.

5.2 Guardian App: An Execution and Organization Hub

The Guardian App serves as a key intermediary between medical instructions and older adults' daily care routines. Family caregivers often face emotional, time-related, and cognitive pressures (Liu et al., 2020). Therefore, one core goal of the Guardian App is to organize prescriptions, reminders, records, and health suggestions into a clear execution workspace, reducing the burden of care coordination.

Caregivers are shown a glimpse of the day's care tasks on the Guardian Workspace page, as illustrated in Figure 7. These include information about medication, completing tasks, any remaining medical instructions, reminders of refills, and the priority task for the day. Caregivers are only shown information that needs to

be completed immediately. This will help the caregivers easily identify what needs to be addressed.

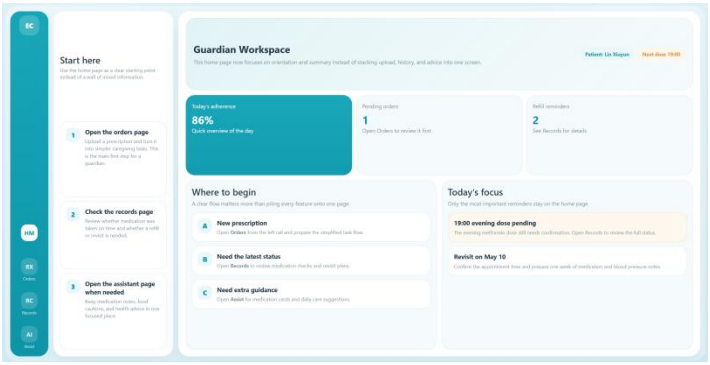


Figure 7. Guardian Workspace overview.

On the Prescription Processing page, caregivers can upload a photo of paper prescription or paste electronic medical instructions (Figure 8). After doctors' review, system shows the simplified results of prescription, converting complex instructions into an actionable step-by-step task list. On the right side, Pillbox Packing Guide further describes which medicine and dosage should be placed into each pillbox compartment, which lessen memory load and risk of error when sorting medication.

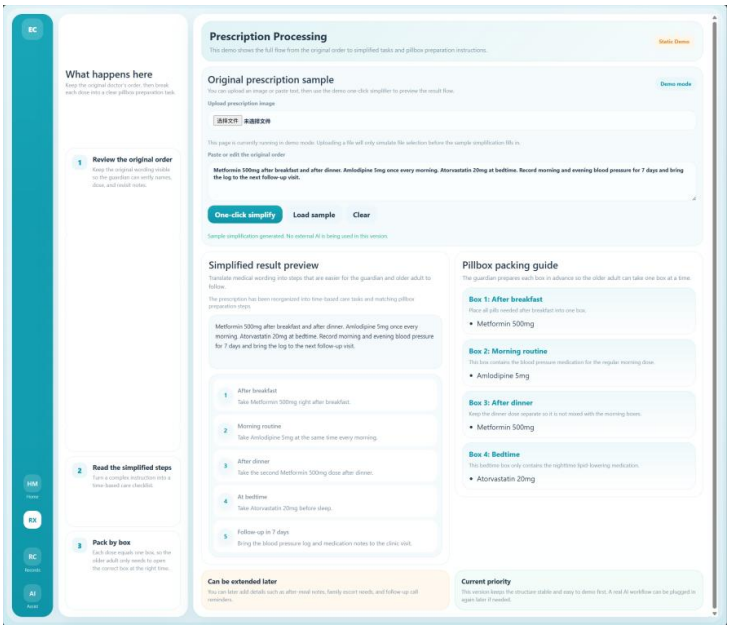


Figure 8. Prescription Processing page.

The Care Records page provides a central location to see information about medication, prescriptions, follow-up appointments, and observations (Figure 9). Caregivers can see which medicines were taken, which remain to be confirmed, and whether refills or follow-ups are needed to make care progress easier to track.

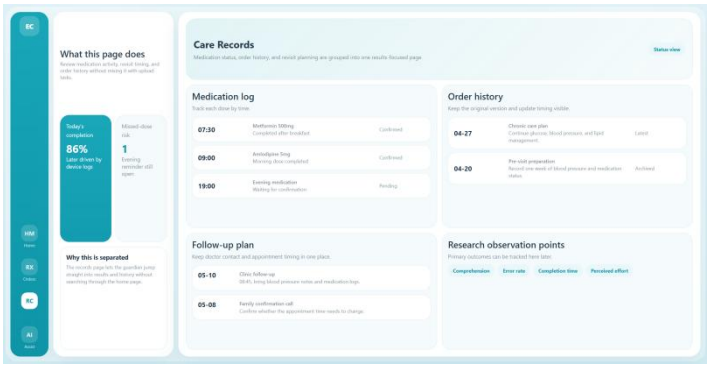


Figure 9. Care Records page.

The medication and health assistant page offers the user medication information cards, dietary precautions, and basic health information (Figure 10). The medication information cards are not a substitute for medical judgment; rather they are intended to help caregivers understand medication purposes, how and why to use them, side effects, and risk alerts in a conservative, referral-oriented manner.

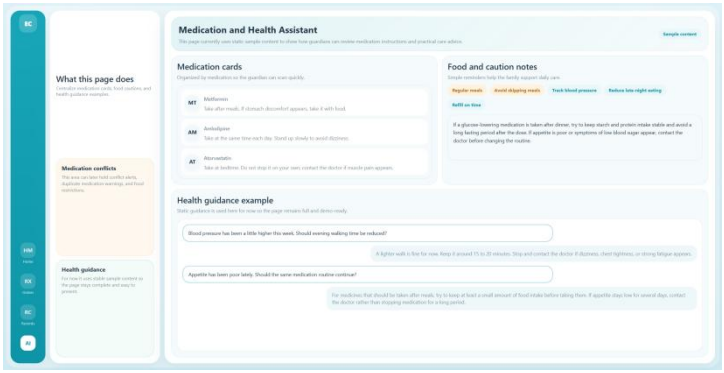


Figure 10. Medication and Health Assistant page.

Overall, the core role of the Guardian App is to translate medical information provided by doctors into actionable and trackable care tasks within the home. This is done to lessen the burden on understanding information and worry on caregivers' end.

5.3 Home Dashboard: A Low-Barrier Information Interface for Older Adults

The Dashboard is a large-screen visual interface placed in frequently used home settings, such as on the refrigerator door, a living room table, or a bedside cabinet. It is mainly designed for older adult users who are not familiar with smartphone use (Figure 11). Its focus is not on complex interaction but the continuous display of "what needs to be done now," enabling users to understand what to do next without actively searching for information.

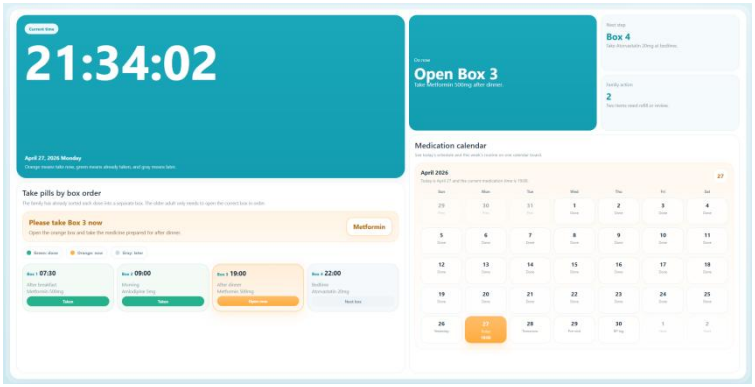


Figure 11. Dashboard page.

The Dashboard visualizes information by displaying time in a large font and organizing pill boxes on a daily calendar. The large font display of current time serves to provide a clear reference for time as well as linking medication tasks with daily routines. Next-step prompts displayed accompanying the current time, such as "Open

Box 3" or "Take pills according to box sequence," translate the general task of taking medicine on time into concrete steps. Therefore, older adulthood only needs to follow the prompt, open the correct pill box, and complete the medication task.

Furthermore, a day's medication tasks are visualized as pill cards according to box sequence, indicating completed tasks, current task, and upcoming tasks. The Medication Calendar on the right uses colors to differentiate different statuses, and allows both older adulthood and caring persons to quickly check whether there are doses missed or delayed. In addition, the page also contains refill reminders, follow up appointments, and the task of household care. This design makes the recent care arrangements easier to understand.

Therefore, the main role of the Dashboard is to translate complex medical instructions and scattered care arrangement reminders to a low-barrier, low-cognitive-load home information interface, then to make "understanding medical instruction" into "knowing exactly what to do next".

5.4 Device Side: Smart Medicine Box — Care Routine Organizer

A series of previous studies revealed that smart medicine box devices could support older adults to improve medication adherence under certain conditions, but such support greatly depends on interface usability as well as system integration (Reeder et al., 2013; Mira et al., 2014). As the physical touchpoint of the system in home environment, the Care Routine Organizers converts doctors-reviewed medication plans into a visible, prompt-based, and recordable daily medication routine. Different from the conventional compartmentalized pill box for medicine

storage, the device not only could help older adults to complete medication tasks more consistently at home, but also connects with system to do so.(Figure 12).

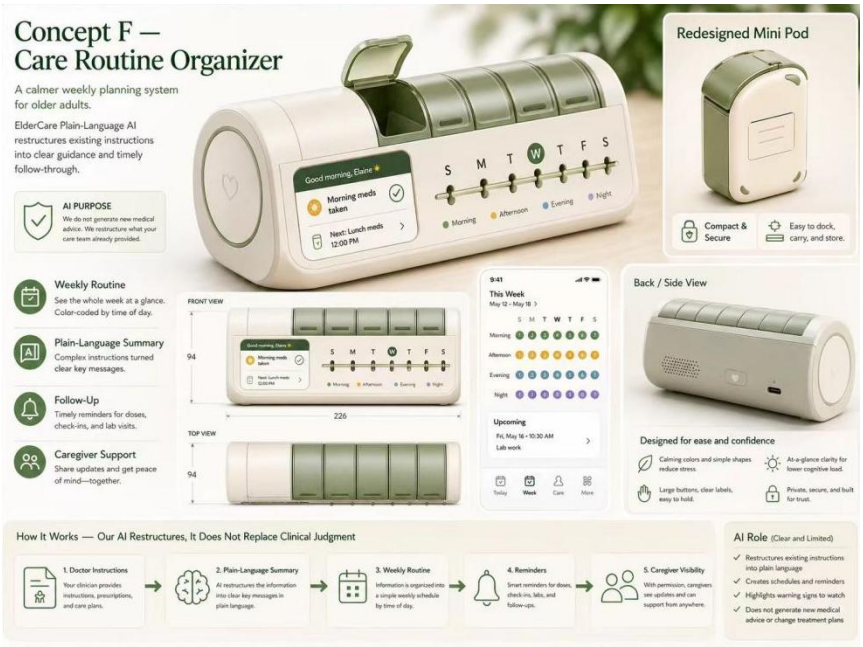


Figure 12. Concept overview of the Care Routine Organizer.

5.4.1 Hardware and Structural Design

A “weekly main unit + detachable daily mini pod” structure is employed by the device. The main unit helps organize the weekly medication and reminder, and caregivers can prepare medications in advance based upon the dispensing guidance obtained from the Guardian App (Figure 13a). The mini pod stores one day’s medication, and it is convenient for the users to carry medicines when going out, follow-up visits, or briefly leaving home (Figure 13c).

A status display area is placed at the front of the device to show the status of currently administered medications and associated plain-language summary, as well

as the following required action, thereby making an abstract medication schedule become directly actionable information. The upper medication-loading compartment or lid enables caregivers to replenish the medicines on a weekly basis, and thus it reinforces the routine of “prepare–remind–act” (Figure 13a). Regarding input and feedback, the device pays more attention to the easy-to-understand physical part, such as buttons, date and task-status display, and surface layout, and the touchscreen is only adopted for some simple operations. The side and back of the device also include a USB-C charging port, a speaker, and a quick confirmation button for charging, audio reminder, medication confirmation, etc. (Figure 13b). With the soft breathing night light and audio prompt, it also helps users to search the medicinebox quickly at night or in the low luminaire environment, while avoiding the excessive stimulation.

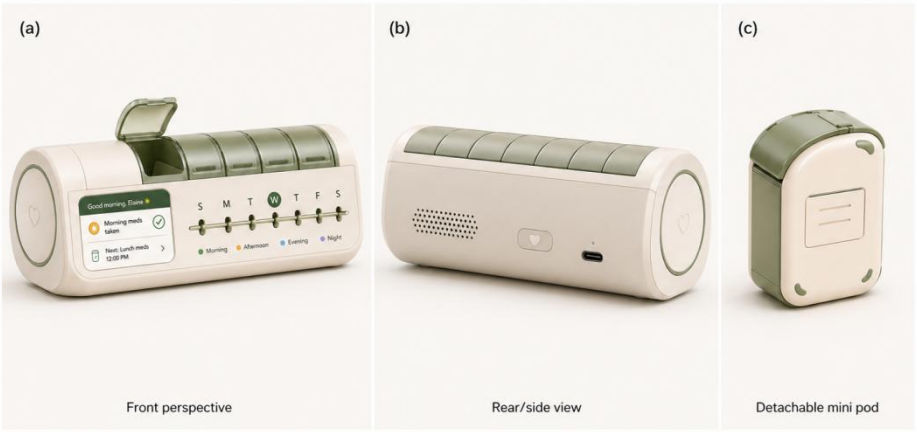


Figure 13.
(a)Front perspective view showing the display area, weekly structure, and refill lid
(b)rear/side view showing the speaker, shortcut button, and USB-C charging port
(c)detachable mini pod for carrying one day’s medication outside the home.

5.4.2 Interaction and Behavior Design

The interaction logic of Care Routine Organizer focuses on “one compartment, one action” and low decision burden. When the pre-set medication time arrives, the

device will provide reminders through time alerts, soft lighting, and sound cues. The front display will show the medication to be taken, the scheduled time, or the next step. Users do not need to remember all the medical instructions to take or the medication information, or which medication to take. Users only need to follow the prompt, open the corresponding compartment, and take the medication.

The device can also record medication-taking behavior with physical buttons or compartment-status feedback. This is more direct than relying solely on the mobile phone's reminder notifications. The whole interaction process can be reduced to a few clear steps, such as checking the prompt, opening the compartment, confirming medication intake, or choosing a later reminder. This helps avoid complex menus and multi-layer operations.

5.4.3 Data Recording Function Linked to the System

As part of our system, the Care Routine Organizer is not only used to remind and assist users to take medication, but also to collect and send back execution records. Lid-opening events, button confirmations, and medication-completing status could be synchronized with the guardian side and the doctor side to form a medication log. In this way, guardians could know whether older adults take their medicine in time, while doctors can review medication adherence in a context closer to real everyday lifetimes before follow-up visits.

Therefore the role of the Care Routine Organizing is not only to “store medication.” Instead, it translates medical instructions into daily routines that could be reminded, carried out, and tracked at home. Together with the Dashboard,

Guardian App, and the Doctor App, it forms the information feedback loop where execution results can return to the system and support later care and clinical judgment.

5.5 The Role and Safety Boundaries of AI

Our proposed system ensures the medical safety of the AI (Figure 14). The task of the AI is solely to reorganize, simplify and task-structure the medical instructions originally provided by doctors so they are easier to understand by older adults and guardians and follow. Thus, the AI is used as a tool for information organization and cognitive assistance, and not as a clinical decision-making agent.

AI Can Do	AI Cannot Do
Rewrite doctors' instructions into plain language	Generate new medical advice or diagnoses
Break long explanations into step-by-step task lists	Change the dosage or treatment plan prescribed by doctors
Highlight warning signs, for example, "Seek medical attention immediately if chest pain occurs"	Publish information directly to the older adult interface without doctor review
Trigger reminders and organize calendars and caregiving tasks	Replace doctors or clinical staff in making judgments

Figure 14. Functional scope and safety boundaries of AI

The simplified content generated when using the AI is not directly transmitted to elders or guardians, but must first undergo a review process involving doctors or clinical staff. According to this review requirement, doctors are required to verify whether the content generated by the AI accurately reflects the key information in the original medical instructions (e.g., the medication name and dosage, medication time, warning symptoms, follow-up requirements), and the content must pass the review and approval of clinical staff to be synchronized to the Guardian App, Dashboard, and

smart pill organizer, in order to reduce the risk of misunderstanding or missing important information.

In the same way, while the interface will clearly display a clear disclaimer, such as: “That this tool merely reorganizes the instructions received from your doctor and does not replace their clinical advice. If you have any urgent or unclear issues, please contact your clinical care provider.”

Such a safety limit can not only reduce users’ overreliance on AI but also prevent the system from introducing new risks in medical settings. In other words, the value of ElderCare Plain-Language AI doesn’t lie in replacing doctors, but in helping doctor-confirmed medical info enter into older adults’ daily life more clearly and in an actionable way.

6. Psychological Principles and Design Rationale

This design addresses the cognitive challenges that older adults may have in understanding, remembering, and implementing medical instructions. Therefore, the system is designed according the information structure, ways of interaction, and device form. The system is specifically influenced by four psychological principles: cognitive load theory, external cognition, encoding and retrieval of information in memory, and gulfs of execution and evaluation.

6.1 Cognitive Load Theory

Cognitive Load Theory: The principle of cognitive load theory states that human working memory has limited capacity, and an overloaded presentation and

representation of information might reduce comprehension and task performance (Sweller, 2019). In addition, people's working memory capacity and processing speed tend not to increase with age (Park & Reuter-Lorenz, 2009),so older people might be more likely to make mistakes when facing dense medical instructions.

Therefore, the system reduces comprehension difficulty through the following means: chunking information, time-based grouping, and visual coding. Based on research on working memory capacity (Cowan, 2001; Miller, 1956), each instruction for medicines is broken down into “one key message + three action steps”, in a way of limiting the number of information chunks presented to users at one time. On one hand, this facilitates the first comprehension of the task, so as to help users in the comprehension of the key point of the instruction. On the other hand, this facilitates the subsequent step-by-step comprehension of the instruction by decomposing it to the three action steps. At the same time, the medicine schedules are organized according to the daily time periods familiar to users, such as morning, before midday, afternoon, and overnight, rather than only on the medicine names. This makes information more in line with the users' daily routines. Finally, in the system, icons and color coding are used to distinguish different time periods and different status of a task, to help users rapidly find the information of interest in the interface.

In both the Dashboard and the smart pillbox, this principle is reflected in the idea of “highlighting only one core action at a time.” Specifically, at each specific moment, the system highlights the current medical action for users to complete, e. g., which compartment to open, which medicine to take. This is aimed to avoid users from

processing too much information at one time. The above principle makes following the medical instructions more direct and easier to be completed.

6.2 External Cognition

As one of the important concepts in cognitive science, external cognition theory proposed that cognitive activity was not limited to the brain. External tools and environmental representations can take on part of the work of the brain in memory and judgment (Scaife & Rogers, 1996), and under appropriate conditions, the human cognitive will expand into the external media (Clark & Chalmers, 1998).

In this system, smart medication box, Dashboard, and Guardian App all provide external cognitive support. On the one hand, the smart medication box could help people judge the status of taking their medicine. Users can check the compartment status and number of remaining pills to see if they have taken the medicine. In the meantime an led indicates whether the user has the reminding signal. On the other hand, dashboard visualizes medication records through a medication calendar. Older adults and guardians can check completed, missed and delayed tasks in a graphical manner. In addition, Care records section in Guardian App displays medical instructions, medication record, medical follow-up schedule and observation notes in one place, eliminating the need to switch between paper instructions, chat records and different applications. So, by the devices, screens and records, this system externalizes easily forgetting information to be visible checkable traceable prompts and alleviates memory burden. In the meantime, it decreases the possibility of execution errors induced by inaccurate memory.

6.3 Gulfs of Evaluation and Execution

According to Norman's (2013) theory of interaction, there are two gulfs between the users and the systems: the gulf of execution, in which the users know what they need to do and what their goal is, but don't know how to do so, and the gulf of evaluation, where the users see the system state but cannot easily interpret its meaning.

In the context of medical instruction, these two gulfs might influence how an older adult follows the instruction on a tablet. As mentioned above, an instruction such as "take after meals" might leave the users not sure of when they should take the pill and in what amounts. The problem becomes more prominent once they have taken the medicine since they will not know whether the task has been accomplished, or they just don't know what the status in the pillbox and the medicine record means. This will lead to missing doses, repeated doses or wrong medication (Figure 15).

Together, these two systems decrease both the gulfs by using two different approaches. While the Dashboard presents direct prompts, these prompts should be used as cues. It should prompt you to do the specific action, such as "Please open compartment 3 now." Then, the pillbox can use lights, sound alerts, and compartment indicators to guide them through the task. Afterward, the pillbox status and medication calendar allow them the ability to easily confirm whether the action has been performed or not. Therefore, it decreased the memory and self-judgement task to complete the task.

Type of Gulf	Older Adults' Difficulties with Paper-Based Medical Instructions	How Our Design Helps
Execution gulf	"Take after meals" is not specific enough: after which meal? How long after eating? How many pills?	The Dashboard directly shows "Now open Compartment 3." The pillbox highlights the correct compartment and provides a specific medication cue, helping the user know exactly what to do next.
Evaluation gulf	Older adults may be unsure, "Did I already take it?" or may not be able to tell whether the current task has been completed.	The pillbox's physical state, opened compartments, and a color-coded medication calendar help users confirm medication status and task completion.

Figure 15. Design Response to the Gulfs of Execution and Evaluation

By reducing the gulfs, the system brings medication adherence from a process of "user interpretation and inference" to be instead supported with clear system prompting and status feedback. These older adults, therefore, would not have to rely completely on their memory to know "what should I take now," nor would they have to rely completely on their own recall of "have I done that already?" These are the very stages of decision-making that are known to become more problematic during cognitive ageing and thus they are exactly the stage where this design would support a key behaviour process.

7. Research hypothesis

This study compares two chronic disease management methods: one is standard written medical guidance, and the other is ElderCare multi-platform support system. The control group used ordinary written instructions; the experimental group used the ElderCare system to convert the doctor's confirmed instructions into simplified task lists, weekly plans, reminders and equipment prompts.

Based on this comparison, this study puts forward the following assumptions (Figure 16):

Table. Research Hypotheses

Hypothesis	Statement
H1	Compared with standard written prescriptions, ElderCare improves the accuracy of caregivers' immediate understanding of doctors' instructions.
H2	Compared with standard written instructions, ElderCare improves the accuracy of home nursing task execution.
H3	Compared with standard written medical instructions, ElderCare reduces high-risk errors, such as taking medication at the wrong time, missed medication, missed re-examinations, or failure to identify dangerous symptoms.
H4	Compared with standard written medical instructions, ElderCare reduces caregivers' management burden and improves their confidence in carrying out nursing tasks.
H5	Compared with standard written medical instructions, ElderCare helps caregivers and doctors understand task completion status more clearly and determine whether further follow-up is needed.

Figure 16. Research hypotheses.

8. Research design and participants

This study adopts a situation-based inter-group comparative design. The control team receives standard written medical instructions and manages medication, re-examination and daily nursing tasks by itself. The experimental group used ElderCare to receive simplified medical instructions, task lists, reminders and equipment tips. The main participants include elderly users and family care. The elderly are the direct users of home dashboards and smart medicine boxes. Home caretakers are responsible for helping to understand doctor's instructions, managing reminders, supervising medication, and communicating with doctors when necessary.

Doctors are not the main participants in the experiment. Their role is to provide original medical instructions and review the simplified content generated by AI before the system content is sent to users.

9. Research process and measurement indicators

The research process is divided into four stages: Medical instructions understanding test: compare the participants' understanding of core medical instructions.

Home execution simulation: Participants complete tasks related to medication, missed medication, dangerous symptoms and follow-up decision-making. Data feedback collection: The system records the completion of medication and sends the feedback to the care and doctor. Delayed recall test: After a period of time, the participants' memory of key information and re-examination tasks is tested.

The main result variables include: Instant understanding accuracy rate: Whether the carere can correctly understand the drug name, dosage, medication time, follow-up requirements and life precautions. Accuracy of home nursing task execution: Whether the participants can correctly complete medication, omission handling, supplementation arrangement, re-examination tasks and daily nursing actions. High-risk error rate: Whether participants have problems such as wrong time or dose of medication, omission, missed follow-up, or failure to identify dangerous symptoms. Auxiliary result variables include: delayed recall, subjective management burden, execution confidence, state awareness and task completion time.

10. Expected results, ethics and limitations

It is expected that the experimental group will perform better in understanding accuracy, task execution accuracy and reducing high-risk errors. ElderCare can help

users understand the doctor's instructions more clearly, complete medication and nursing tasks more accurately, and reduce mistakes caused by forgetting or misunderstanding.

In terms of ethics, ElderCare will not replace doctors and will not provide independent medical advice. Its function is to simplify, structure and support the implementation of existing medical instructions. The content generated by AI must be reviewed by the doctor before it can be sent to the user. In uncertain or high-risk situations, the system should prompt users to contact professional medical staff.

This research also has limitations.The sample size and test cycle may be limited, so the study cannot fully reflect the situation of long-term home care. Multi-platform systems may also increase the complexity of use.

Reference

Centers for Disease Control and Prevention. (2025). Plain language materials & resources. https://www.cdc.gov/health-literacy/php/develop-materials/plain-language.html

Haimovich, A. D., Mulqueen, S., Carreras-Tartak, J., Gettel, C. J., Schonberg, M. A., Hastings, S. N., Carpenter, C. R., Liu, S. W., & Thomas, S. H. (2024). Discharge instruction comprehension by older adults in the emergency department: A systematic review and meta-analysis. Academic Emergency Medicine, 31, 1165–1172. https://pubmed.ncbi.nlm.nih.gov/39264024/

Schönfeld, M. S., Pfisterer-Heise, S., & Bergelt, C. (2021). Self-reported health literacy and medication adherence in older adults: A systematic review. BMJ Open, 11(12), e056307. https://pmc.ncbi.nlm.nih.gov/articles/PMC8679075/

Sharko, M., Wilcox, L., Hong, M. K., & Ancker, J. S. (2022). Strategies to optimize comprehension of numerical medication instructions: A systematic review and concept map. Patient Education and Counseling, 105(10), 3054–3067. https://pmc.ncbi.nlm.nih.gov/articles/PMC9203902/

Wang, W., Li, X., Zhao, Y., Sun, X., & Zhang, X. (2023). Association between medication literacy and medication adherence in older people with multimorbidity. BMC Geriatrics, 23, Article 410. https://link.springer.com/article/10.1186/s12877-023-04072-0

Clark, A., & Chalmers, D. (1998). The extended mind. Analysis, 58(1), 7–19. https://doi.org/10.1093/analys/58.1.7

Liu, Z., Heffernan, C., & Tan, J. (2020). Caregiver burden: A concept analysis. International Journal of Nursing Sciences, 7(4), 438–445. https://doi.org/10.1016/j.ijnss.2020.07.012

Marcum, Z. A., & Gellad, W. F. (2012). Medication adherence to multidrug regimens. Clinics in Geriatric Medicine, 28(2), 287–300. https://doi.org/10.1016/j.cger.2012.01.008

Mira, J. J., Navarro, I., Botella, F., Borrás, F., Nuño-Solinís, R., Orozco, D., Iglesias-Alonso, F., Pérez-Pérez, P., Lorenzo, S., & Toro, N. (2014). A Spanish pillbox app for elderly patients taking multiple medications: Randomized controlled trial. Journal of Medical Internet Research, 16(4), e99. https://doi.org/10.2196/jmir.3269

Norman, D. A. (2013). The design of everyday things (Revised and expanded ed.). Basic Books.

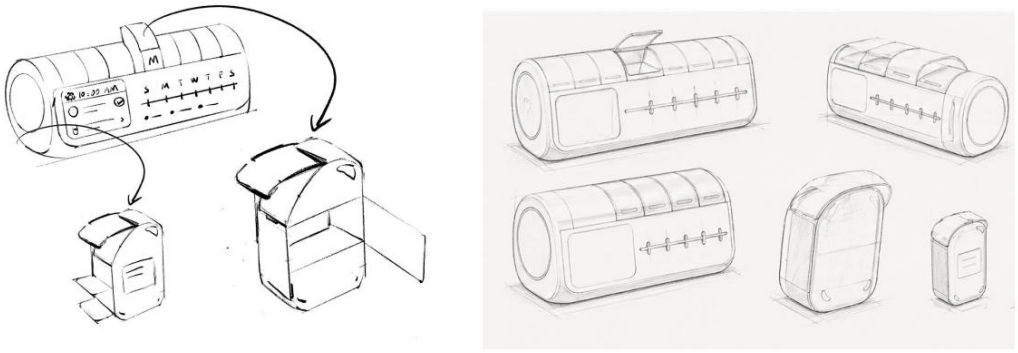
Park, D. C., & Reuter-Lorenz, P. (2009). The adaptive brain: Aging and neurocognitive scaffolding. Annual Review of Psychology, 60, 173–196. https://doi.org/10.1146/annurev.psych.59.103006.093656

Reeder, B., Demiris, G., & Marek, K. D. (2013). Older adults' satisfaction with a medication dispensing device in home care. Informatics for Health and Social Care, 38(3), 211–222. https://doi.org/10.3109/17538157.2012.741084

Scaife, M., & Rogers, Y. (1996). External cognition: How do graphical representations work? International Journal of Human-Computer Studies, 45(2), 185–213. https://doi.org/10.1006/ijhc.1996.0048

Sweller, J., van Merriënboer, J. J. G., & Paas, F. (2019). Cognitive architecture and instructional design: 20 years later. Educational Psychology Review, 31(2), 261–292. https://doi.org/10.1007/s10648-019-09465-5

Appendix A : Development Process of the Care Routine Organizer Product Concept



A.1. Product Concept Sketches

A.2. Product Modelling Process

A.3. Product Renderings

A.4. Product Concept Board

Website Link: https://j1aj1n.github.io/Elder/

Appendix B : Group Contribution

group 2

Name	Student Number	Contribution
LI ZHIYI	1010996	Brainstorming、Secondary research、Make a proposal pitch PPT、Write a thesis、Finally revise the article
CHEN XINGYU	1010807	Brainstorming、Secondary research、Write the proposal、Write a thesis、Product design discussion、Web-based software design、product draft、poster、product redering
LI LAN	1010791	Brainstorming、Secondary research、Write a thesis、Product design discussion、Web-based software design
ZHENG JIAJIN	1010764	Brainstorming、Secondary research、Web-based software design、Product design discussion
SHA YIPING	1010839	Brainstorming、Secondary research、Write a thesis、Finally revise the article