User Survey Findings

Asclepius Innovation

PROJ02-01

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Summary

Date of Report: [09 30, 2024]

Date of Interview(s): [09 24, 2024] - [10 02, 2024],...

Date: 09 30 2024

Please print your name: Brian Paragas, Kenny Harman, Crystal Cheung, Madoka Nogaki, Nathan Yee

Please sign your name:

Who we interviewed / surveyed

Audience Type

Manages own medication/Someone Else	8
Someone else manages	1
TOTAL (participants)	**9**

Age

18-24	2
25-34	1
45-54	0
55- 65+	6
TOTAL (participants)	**9**

Gender

Women	6
Men	3
TOTAL (participants)	**9**

Conducted interviews with 3 different healthcare workers.

Secondary User Interview (Urgent Care Nurse & Registered Nurse)

Secondary User Interview (Caregiver)

Secondary Research

Surveys
Interviews
Articles
Academic Resources

Description

The Asclepius Innovation team conducted secondary research through surveys, interviews, articles and other existing user research. This research was done to further enhance our insight on the target demographic and lead to further development of our app. Through this research we identified commonalities between the user's wants and needs, information on medication adherence and ways to improve medication routine practices.

Findings & Results

Survey Responses Link

Survey Responses View Analytics

Secondary Research Document

Primary User Interview (Self Administered Medication Routine)

Secondary User Interview (Urgent Care Nurse & Registered Nurse)

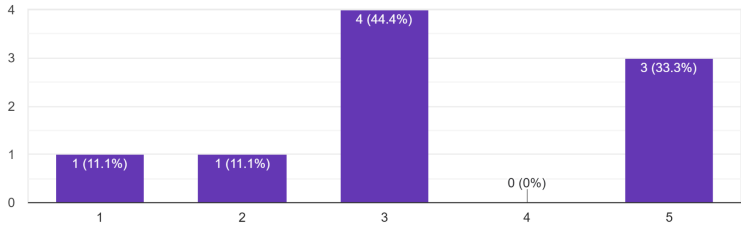
Secondary User Interview (Caregiver)

Daily Task Flow (Survey)

- Majority uses manual reminders
- Forgetting to take medication happens sometimes or often
- Missed doses due to not realizing they needed a refill
- Sometimes experience confusion over WHEN to take medication
- Majority never confused over HOW to take medication
- Majority sometimes forget if taken medication or not
- Majority has no difficulty in understanding purpose or dosage instructions

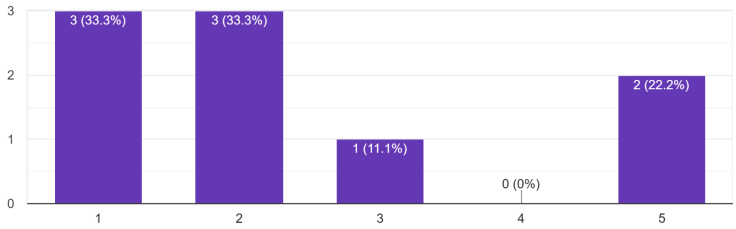
How confident are you in your ability to track your medication schedule accurately?

9 responses



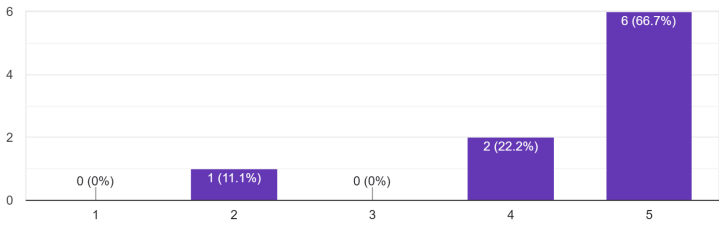
How concerned are you about accidentally taking the wrong medication or dosage?

9 responses



How important is it for you to understand the purpose of each medication you're taking?

9 responses



Comparison with existing competing apps (Survey)

Positives

- Easy to use
- Visual Aspect
- Notifications
- Recording and monitoring body condition

Improvements

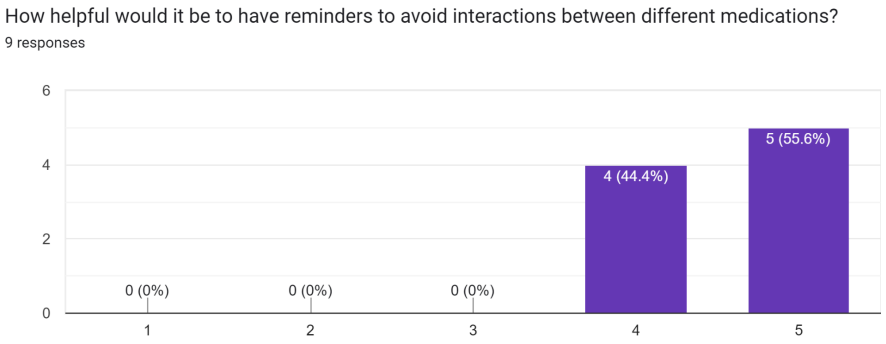
- Alarm adjustments
- Persistent Notifications
- "Snooze" reschedule feature
- Mark as "Taken" through notifications

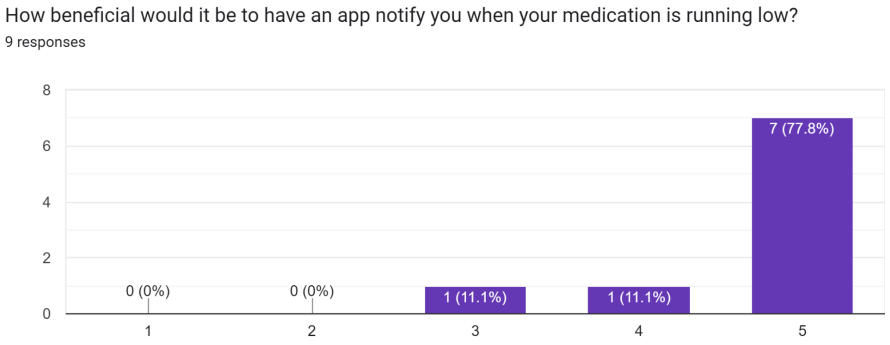
User Needs & Expectations (Survey)

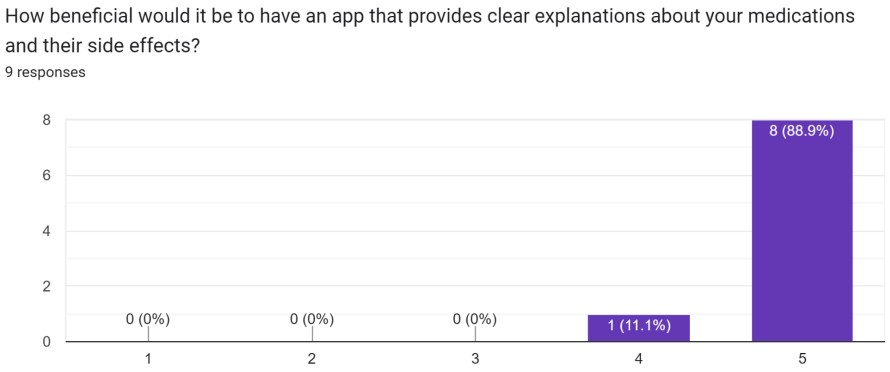
- Majority would value caregiver integration/allow someone else to monitor medication adherence

Additional Features/Adjustments

- Privacy customization for caregiver integration
- Full customization for notifications, icons and colours
- Flexible reminders
- Alert family members/caregivers about user missing doses







Additional Secondary Research Aside From Interviews & Surveys

- **Findings on general use of medications**
    - Purpose of prescribing medicines to patients with chronic conditions is to reduce morbidity and mortality
    - For the overall benefits of prescriptions to occur patients must **understand** why their medications have been prescribed
    - Up to 50% of patients requiring medication struggle with taking it as prescribed *(Fuller et al., 2021)*
    - There have been attempted interventions to inform patients of the importance of taking these medications, but these efforts were not able to be retained
    - Over decades a considerable percentage of patients **do not receive the proper information or support** to take their medication as directed
    - Research on patients' experiences of taking medicines/medications has identified it as a complex social interaction

- **Findings on caregiving and medical routines**
    - Caregivers often manage medications, including pill boxes, intravenous fluids, or injections
    - **Informal caregivers** often handle complex medication regimens for older adults with multiple chronic conditions
    - Many caregivers **(formal and informal)** feel unprepared for medication management, with many reporting issues like medication supply and communication challenges
    - Many caregivers learn medication management on their own, with almost half receiving no training
    - Caregivers gather medication information from providers, pharmacies, and online sources to monitor for side effects and ensure safety
    - Many caregivers are responsible for administering **5+ prescription medications daily**
    - Caregivers are responsible for organizing and ensuring medication adherence, which is **more difficult** for recipients with conditions like dementia
    - Caregivers often perform clinical judgment tasks related to medications, such as deciding when and how to adjust medications based on the care receiver's condition

- **Remembering to take your medication — existing methods and recommendations**
    - Create a routine
        - Take medication with an activity you do at the same time every day.
    - Keep it visible

        - To avoid “out of sight, out of mind”, leave medication in a safe place that is easy to spot.
    - Set an alarm
        - An alarm on your cell phone or watch can be helpful, especially if you're busier at certain times of the day or the timing is important.
    - Post a note
        - Put a reminder note somewhere it will be seen every day.
    - Use a pillbox
        - A weekly pill box with compartments for each day and dosing time can be a visual reminder to take medication and help prevent double doses.
    - Flip pill bottle over
        - Each time you take your medicine, flip the pill bottle over so you know it has been taken.
    - Carry extra doses
        - Leave some extra doses in a bag/purse you use often so you can take your medicine if you’re away from home.
    - Record each dose
        - Use a calendar or medication journal and check off when you take each dose. This can help you avoid missing doses or taking too many.
    - Keep medicine with each caregiver
    - If you ever stay with different caregivers, keep some medicine at each house.

- **Who is in need of medical reminders?**
    - Some people live with cognitive impairment due to conditions such as dementia or trauma and cannot remember to take a pill. Some individuals have complex medication routines that are challenging to manage. An older adult with an irregular or **"as-needed"** pill schedule might require a reminder when medication is available to address an occasional issue.
      Medications often have **specific instructions**, like timing, dietary restrictions, or storage requirements, which must be followed for effectiveness and to avoid side effects. Elders, especially on multiple medications, may need help managing these details. *(April, 2019)*

- **Why medication reminders are vital**
    - The Centers for Disease Control and Prevention **(CDC)** reports that from 2011 to 2014, 48.9% of individuals used at least one prescription medication in the past 30 days. A study by the Mayo Clinic revealed that **20% of Americans take five or more prescription drugs.** Additionally, statistics indicate that the majority of older Americans take at least one medication daily to manage a chronic illness.
      Missing a dose or misusing medication can lead to no health improvements or serious side effects. After hospital discharge, following important

short-term medications can **significantly affect recovery at home and the risk of readmission.** *(April, 2019)*
    - Having a routine reminder can contribute to user safety and health

- **Medical reminders for seniors — existing methods and recommendations**
    - Alarm
        - Attention grabbing and easy to set up but frustrating for seniors who struggle with technology.
    - Medication reminder chart
        - Good for people who need a visual reminder but difficult for forgetful elders that don't fill in the chart.
    - Pill case reminder
        - Good to keep track of doses.
    - Verbal reminder
        - Works if you see them frequently.

- **Patient Medication Adherence: Measures in Daily Practice**
    - Treatment success depends on adherence, and **non-adherence harms both patients and the healthcare system**, worsening health and raising costs. Factors like patient, provider, and health system barriers affect adherence. Healthcare professionals play a key role in improving it. Medication adherence, as defined by the WHO, is how well a patient's behavior aligns with a healthcare provider's recommendations. **While often used interchangeably, adherence differs from compliance.** Compliance refers to following the prescriber's advice, implying obedience. In contrast, adherence involves collaboration between the patient and physician, considering the patient's lifestyle, values, and preferences. *(Oman Med J, 2011)*
    - *Types of non-adherence often overlap.*
        - Primary non-adherence:
            - Occurs when a prescription is written but never filled or started.
            - Also known as non-fulfillment adherence.
        - Secondary non-adherence:
            - *Non-persistence:*
                - Patients stop taking medication after starting, without advice from a healthcare provider.
                - Often due to miscommunication between patients and providers.
            - *Unintentional non-adherence:*

            - Caused by capacity or resource limitations **(e.g. difficulty accessing prescriptions, cost, competing demands).**
            - May involve individual constraints **(e.g. poor inhaler technique, forgetfulness).**
        - *Intentional non-adherence:*
            - Stemming from patient beliefs, attitudes, and expectations that affect motivation to start or continue treatment.
    - Tertiary non-adherence:
        - *Non-conforming non-adherence:*
            - Involves not taking medication as prescribed.
            - Examples include:
                - Skipping doses.
                - Taking medication at incorrect times.
                - Taking incorrect doses (too much or too little).
                - Taking more than prescribed.
- Adherence rate is the percentage of prescribed doses actually taken by the patient over a specific period.
- Non-adherence ranges from **10% to 92%** across studies.
- In developed countries, average adherence to therapies is about 50%.
- Half of non-adherence is intentional; the rest occurs due to unawareness or complex regimens.
- **Adherence is higher in patients with acute conditions** than those with chronic conditions.
- Patients with chronic illnesses take **only ~50% of prescribed medications**.
- Non-adherence to medication leads to wasted resources, disease progression, reduced quality of life, and greater use of medical services such as hospitalizations and nursing homes. Economic studies confirm serious health consequences, including a higher risk of hospitalization. For example, patients with conditions like diabetes, high cholesterol, hypertension, or heart failure face double the risk of hospitalization when they don't follow prescribed therapies. Similarly, COPD patients with poor adherence to treatment experience more emergency hospitalizations. *(Oman Med J, 2011)*
- Medication non-adherence has negative consequences not only for patients but also for healthcare providers, physicians, and medical researchers. This issue poses a significant burden on healthcare delivery, making it an important public health concern. By helping individuals take their medications correctly, we can mitigate the risks of severe relapses, antibiotic resistance, and preventable hospitalizations. *(Oman Med J, 2011)*

- **What influences medication adherence?**
    - Non-adherence is common among patients with drug-taking behaviors.
    - Complexity of adherence arises from various factors, including:
        - Patient views and attributes
        - Illness characteristics
        - Social contexts
        - Access and service issues
    - Barriers to effective medication use include:
        - Poor provider-patient communication
        - Inadequate knowledge about drugs
        - Lack of conviction about treatment necessity
        - Fear of adverse effects
        - Long-term and complex drug regimens
        - Cost and access barriers
    - Non-adherence varies between and within individuals, as well as across time, behaviors, and diseases.
    - Adherence rates differ by age group:
        - Children depend on adult caregivers, affecting adherence.
        - Elderly patients show compliance rates between 38% and 57%, averaging less than 45%.
    - Higher patient-physician discordance leads to decreased patient satisfaction, with 40-60% of patients unable to correctly report their physician's expectations shortly after receiving information.
    - Over 60% of patients misunderstand medication directions immediately after doctor visits.
    - Complexity in medication regimens contribute to non-adherence, including:
        - Improper timing of administration
        - Frequent or unusual dosing schedules
    - Most non-adherence results from omitted doses or delays rather than excess doses.
    - Non-compliance is more common in chronic diseases (e.g., hypertension), where patients often experience no unpleasant symptoms.
    - Compliance rates are higher (77%) when treatments aim to cure a disease compared to prevention (63%), with long-term treatments dropping to around 50%.
    - Patients' ability to read and understand medication instructions affects adherence, particularly for those with low literacy.

    - Gender, personality, and cultural factors can influence adherence rates, with women generally adhering better to behavioral health medications.
    - Some studies indicate that common demographic factors (age, marital status, etc.) do not consistently relate to non-compliance

- **Methods to improve medication adherence**
    - Level of prescribing:
        - Implement a collaborative approach with patients during prescribing.
        - Involve patients in medication decision-making to foster a sense of ownership and partnership in their treatment plan.
        - Simplify medication regimens based on patient characteristics at the initial stage of drug use.
    - Communicating with the patient:
        - Explain key information when prescribing or dispensing medication, including:
            - What the drug is.
            - Why is it prescribed?
            - When to take it.
            - How to take it.
            - Duration of the treatment.
        - Inform patients about common side effects, including those they need to know, to prevent anxiety and non-adherence due to lack of prior warning.
        - Use Adherence Aids:
            - Provide medication calendars or schedules indicating when to take medications.
            - Use drug cards, medication charts, or information sheets.
            - Offer specific packaging options like pill boxes, 'unit-of-use' packaging, and containers indicating dosing times.
        - Provide Behavioral Support:
            - Collaborate with patients to integrate medication regimens into their daily routines, especially for those on complex regimens or elderly patients facing unintentional adherence difficulties.
    - During follow-ups:
        - Schedule Appropriate Follow-Ups:
            - Include monitoring of medication adherence as a criterion for follow-up appointments.
        - Assess Adherence:

        - Measure adherence using various methods based on patient and drug characteristics.
        - Evaluate the effectiveness of any adherence aids used by both physicians and pharmacists.
- Identify Difficulties and Barriers:
    - Address the problems related to adherence.
    - Inform patients about how these problems have been resolved.
- Involve Patients in Decision-Making:
    - Essential for improving medication adherence.
    - Identify underlying causes of non-adherence to determine appropriate interventions.
- Address Forgetfulness:
    - A major reason for non-adherence, with 49.6% of patients citing it as a non-intentional issue.
    - Implement reminders through:
        - Mailed letters
        - Telephone calls
        - Emails
        - Text messages
        - Alarms
    - Involve caregivers to combat forgetfulness.
- Address Perceptions of Necessity:
    - Non-adherence may stem from patients perceiving medications as unnecessary or fearing adverse effects.
    - Provide clear medication information covering:
        - What, why, when, how, and how long to take the medication.
    - Supplement counseling with detailed written information, such as:
        - Drug cards
        - Medication charts
        - Laminated instructions for easier comprehension, especially for the elderly.
- Alleviate Fears of Adverse Drug Reactions:
    - Educate patients on common side effects, prevention of adverse reactions, and the necessity of treatment.
- Simplify Medication Regimens:
    - Complexity negatively impacts adherence.
    - Modify regimens to reduce:

        - Frequency of administration
        - Number of different medications
        - Consider using combination products.
    - Emphasize patient cooperation and participation in disease management.
- Enhance Communication:
    - Patient-healthcare professional communication, particularly between patients and physicians or pharmacists, is vital for optimizing adherence.

- **Methods to measure adherence**
    - Direct Methods:
        - Directly observed therapy.
        - Measurement of drug or metabolite levels in blood or urine.
        - Detection of biological markers added to the drug formulation in blood.
        - *Advantages and disadvantages:*
            - Highly accurate.
            - Expensive.
            - Variations in metabolism and "white coat adherence" can lead to false adherence impressions.
    - Indirect Methods:
        - Patient questionnaires and self-reports.
        - Pill counts.
        - Rates of prescription refills.
        - Assessment of clinical responses.
        - Electronic medication monitors.
        - Measurement of physiologic markers.
        - Patient diaries.
        - *Advantages and disadvantages:*
            - No single method is considered the gold standard.
            - Patient self-reporting is the simplest method.
    - Assessing Children's Adherence:
        - Involve caregivers (e.g., school nurses or teachers) for support.
    - Common Methods:
        - Questioning Patients:
            - Easy to use but can lead to misrepresentation and overestimation of adherence.

- Pill Counts:
    - Count remaining pills in medication bottles.
    - Disadvantages:
        - Patients may switch medications between bottles or discard pills before visits.
        - Does not provide information on dose timing or drug holidays.
- Rates of Prescription Refills:
    - Accurate measure of overall adherence in closed pharmacy systems **(e.g., health maintenance organizations with universal drug coverage).**
- Electronic Monitors:
    - Record and timestamp opening of bottles, dispensing drops, or activating inhalers.
    - Disadvantages:
        - May not accurately reflect adherence, as patients can open containers without taking medication or take incorrect dosages.

Major findings and recommendations

Major Commonalities

- Tracking medication issues
    - People experience confusion over when to take their medication and often forget whether or not they've taken it already.
    - Recording/Document medication intake
- Importance in understanding the medication
    - A reason for medical adherence is due to patients not knowing the purpose of why they require the medication.
    - Educate the user on their medication to reduce barriers for effective medication use.
    - Alleviate fears through education
- A phone alarm is the primary alert reminder
    - The simplicity and user-friendliness leads to the majority of users opting for that application.
- Annoying sounds
    - Default alarm sounds installed should be customizable to better the user's experience.

Minor Commonalities

- Support neurodivergent users
    - Allow for full customization and implement flexible and adaptive reminders to help aid forgetful users.
    - Persistent notification to prioritize the medication reminder to reduce the chance of forgetting; reminders through emails, texts, calls and alarms.
- Visuals are essential
    - Use adherence aids such as calendars to view and closely visualize the tracking.
    - Drug cards, medication charts, or information sheets
- Medication specifics should be easily showcased
    - dietary restrictions, storage requirements, timing
    - help avoid side effects and ease managing multiple medications
- Create sense of ownership for the patient
    - Involve patient in medication decision-making

Major Differences

- Users would like a notification feature to alert family members/caregivers about missed doses however there are concerns about user privacy.
    - The information shared with the caregiver should be customizable to allow user control of their information.
- Concerns in taking the wrong medication range between patients.

    - 3 patients had no concern, 3 patients slight concern, 1 patient neutral and 2 patients heavily concerned.
- 50/50 between users using an app to aid them in medication reminders.
    - Aim to convert people that don't use an app to help aid their medication routine.
- Medical reminders are needed for people with cognitive impairment, complex medication routines or older individuals with irregular routines.
    - Prioritize these target demographics.
- 20% of Americans take five or more prescriptions;older Americans take at least one medication daily for chronic illness.
- Most non-adherence is due to omitting or delayed doses compared to excess doses.

Pain Points or User Frustrations

- High learning curve or overcomplicated
    - The app should be simple for easy of use and negate the chance of overloading the user with information.
- Secondary non-adherence cause by miscommunication between patients and providers; resolved through easy communication to provider
- Limited Scope or bare minimum features; Users lack features in other tracking apps.
- Ability to read and understand the instructions affects adherence, particularly in low literacy; implement text to speech

Other Findings

- Verbal reminders are helpful for seniors such as text to speech implementation
- Half of non-adherence is intentional; rest occurs due to unawareness or complex regimens
- Adherence is higher in patients with acute conditions in comparison to chronic conditions
- Patients with chronic illnesses take only ~50% of prescribed medication
- Over 60% of patients misunderstand medication directions
- Improve medication adherence through adjusting medication regimen based on patient characteristics

Action Points and Recommendations

Our team's research, which includes surveys, interviews, and an extensive review of secondary sources such as documentation, articles, and studies, seeks to explore the daily routines and challenges faced by two key groups: **(A) primary users of prescription medications and their informal caregivers (if applicable)**, and **(B) secondary healthcare providers and formal caregivers**. This research aims to gain deeper insights into the pain points associated with medication management and caregiving responsibilities, as well as investigate the causes and solutions to medication adherence. By analyzing the data collected from these sources, combined with a detailed evaluation of existing applications and platforms, we aim to identify opportunities for improvement and to offer an informative and user-friendly platform within the medication tracking and healthcare support space. Based on this research, these are steps we plan to take towards achieving this:

- **Make reminders engaging and comprehensive**
    - Many users forget to take medication due to busy schedules or forgetfulness, and a common issue is not being sure if a dose has been taken. Additionally, users sometimes miss doses because they do not realize their medication needs refilling. Users should receive clear and persistent reminders to boost adherence. Surveys show a majority of users value notification flexibility, and users frequently forget if they have taken medication. Persistent notifications and easy marking of tasks as “taken” through the reminder screen address these pain points.
        - Solution 1: Prompt a friendly, engaging reminder to take medication at the scheduled time. This reminder should repeat at incremental intervals until the medication is marked as taken. By using a consistent alert system users will be more engaged in managing their medication.
        - Solution 2: For overdue tasks, users should receive a clear, visible indicator on the user’s reminder tab next to the overdue task (e.g., larger font size, color change). This ensures the user can easily spot missed doses and take corrective action. Notifications should persist until marked as "Taken" or rescheduled to reinforce the importance of staying on track.

- **Provide informative insights into user medications**
    - Medication non-adherence is often linked to users not fully understanding the benefits or purpose of their medication. This knowledge gap leads to decreased motivation to take it as prescribed, particularly for chronic conditions where symptoms might not be immediately felt. According to our research, non-adherence often stems from a lack of understanding of the medication's purpose, and up to 60% of patients misunderstand instructions immediately after visiting their doctor. By making this information easily accessible, we mitigate these common issues.
        - Solution 1: Each medication entry active on a user should include easy-to-understand descriptions of its purpose and potential health benefits to promote adherence.

        - Solution 2: The app should include a section that educates users about their specific medications. This tab would provide critical details, such as what the medication does, how it impacts their long-term health, potential side effects, and why taking it on time is essential for managing their condition. This section would reduce confusion and help users feel more empowered in managing their medication.
            - Additionally, it may be beneficial to provide users with supplementary resources, such as medical articles, to further inform users

- **High adherence to accessibility standards**
    - Given that we aim to assist those with busy schedules or cognitive impairments, it's essential that the interface is highly accessible. This includes older adults, people with memory issues, or secondary caregivers managing complex medication regimens for others. Survey data indicates a need for flexible reminders and caregiver integration, with many caregivers managing five or more medications daily. The research also highlighted the difficulties faced by caregivers, such as inadequate preparation for managing medication, making these features crucial.
        - Solution 1: Offer accessibility customizations, including large fonts, high-contrast, voice-to-text features, and text-to-speech capabilities. These adjustments cater to elderly users or those with vision impairments, memory issues, and neurodivergent users who may need additional support in adhering to their medication routines.
        - Solution 2: Commit to a streamlined user interface with a low learning curve, catering not only to users administering their own medications, but also to caregivers needing to manage several medications daily. The overall goal should be to improve efficiency and quality of life for primary and secondary users

- **Target user-centered design for medication adherence**
    - Non-adherence is influenced by many factors, including forgetfulness, complex regimens, and the feeling that medication is unnecessary or fear of side effects. Medication management should be intuitive and provide the user with a sense of ownership over their health decisions. The app should promote a higher level of engagement with users, making them more likely to adhere to their medication routines.
        - Solution 1: Incorporate user feedback loops, such as customizable notification urgency and friendly reminders, into the app. This allows users to feel in control of their medication schedule and decisions. Additionally, using educational pop-ups for users struggling with adherence (such as providing the user information on negative effects of missing doses) would encourage them to continue with their medication and explain the long-term benefits of consistent usage.
        - Solution 2: Allow users to to be able to customize their reminders and user experience, providing customization of alerts and reminder

increments for certain medications, using different icons, colors, or even font sizes depending on urgency or user preference

- **Simplify and personalize medication management**
    - A recurring theme in our findings is confusion over when to take medication or whether a dose had already been taken. Complexity in medication regimens can lead to unintentional non-adherence, especially when users manage multiple medications with different instructions. Our findings revealed that users often experience confusion over when to take their medication and whether they've already taken a dose. Additionally, 50% of patients with chronic illnesses only take about half of their prescribed medications, often due to unintentional non-adherence. A simplified, visual approach helps mitigate this issue.
        - Solution 1: Simplifying a user's daily task flow with a customizable medication schedule would reduce confusion and increase adherence. Users should be able to clearly see when medication is due and record doses in a straightforward manner (a button click). Additionally, allowing users to adjust alarms (timing, sound, visual cues) and providing medication cards that list all important instructions (e.g., dosage, storage, dietary restrictions) will further aid in reducing confusion.
        - Solution 2: Allow users to easily be able to check off each dose they've taken. The visual tracking of daily medication would allow users to avoid double dosing or missing a dose. Integration with a pillbox tracker or calendar would reinforce the medication routine, enhancing clarity and adherence.

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