

Dr.Health: Advanced Pill Reminder Application

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INTRODUCTION:

Taking medication as prescribed plays a significant role in controlling conditions and improving health. As much as 30-50 percent of people with chronic diseases fail to take their medicine without missing out doses. This is a serious problem. One of the leading and arguably innocent reason for this issue is forgetfulness. Because of failure to take medications adequately, each year billions of dollars in addition to overall medical expenses are spent for the hospitalization and repeated physician visits. This problem predominantly persists in the more elderly population because of their inability to manage self-manage their prescription medicine at home. Another reason for people to avoid medication is side effects. Often the side effects are preventable and manageable with a fair amount of medical guidance. So a system capable of timely reminding people of their medication and providing the appropriate information on their medication can substantially avert this problem.

USER PROBLEMS:

Various reasons for skipping medication. Forgetfulness is one of those. Within ten days of prescribing medication, one in three patients tends to miss doses (according to govt report). According to studies, 57% of the people with long-term conditions stop taking their medicine within six months. In case of elderly population, various medications that are prescribed lead to forgetting and make errors while taking their medication resulting in potential consequences. Studies found that little aid and information helped the elder to take their medication properly and tackle the side effects of the drug.

Other reasons for people to skip their medicine are being troubled by the side effects, having difficulty swallowing their medicine and just not believing that medications would help. These problems mainly arise because of information gap about their condition and side effects of their medication.

USER RESEARCH:

Users need a system which will push them to adhere with their medication strictly. There are a lot of applications currently existing which remind people about their medication but don't make sure that if the medicine has been taken. Knowing the potential side effects of the medicine would have helped users to deal with side effects by opting for an alternative medicine or by changing their lifestyle (food habits etc.). When asked about application restocking medicine for them, they felt that it would make their life easier.

NEED FINDING TECHNIQUES:

Needfinding is one of the processes through which we can understand user needs better. Understanding needs are important as they are often overarching while solutions can regularly change. Targeting the users of the data is essential.

- People with medical condition
- People taking supplements
- People are consuming medicines daily.

GOALS BEHIND CHOOSING TECHNIQUES:

Google survey: Because of its anonymous nature and extensive reach.

Interview: Better understanding of needs and problems.Helps in giving context and motivations to behavior during participant observation. Emotions and reasoning while they answer to questions to provides implicit information about the problem.

TASKS PERFORMED:

- Created Google survey form and published it online.
- Handed out survey to students in UNCC campus.
- Selected a set of people for interview and participant observation based on responses from the survey.
- A set of instructions were prepared for the candidates as part of participant observation.
- Interviews were conducted by the representatives of the target users.
- Performed analysis on the data gathered from various need finding techniques.

DATA GATHERING:

ONLINE SURVEY:

Google forms were used to conduct the study.

[https://docs.google.com/forms/d/e/1FAIpQLSd5ROFUIYZLfgnQ-ZxNOTLdDu031o1yiIW4_a9FJCKLfRujEA/viewform?usp=sf link](https://docs.google.com/forms/d/e/1FAIpQLSd5ROFUIYZLfgnQ-ZxNOTLdDu031o1yiIW4_a9FJCKLfRujEA/viewform?usp=sf_link)

INTERVIEW QUESTIONS:

1. How often do you consume medicines?
2. Where do you store your medications?
3. How do you remind yourself to take the medicines?
4. Do you use any health tracking app?
5. Does your health tracking app satisfy your need?
6. How much quantity of medicines do you buy at a time?
7. Where do you purchase your medicines?
8. Do you think online delivery is a convenient option?
9. How often do you forget to take your medicines?
10. What do you do when you skip a dosage?
11. What kind of reminder do you prefer?
12. What features do you expect from a reminder application?
13. Would you like to reach out to family/friends using the application?
14. Have you ever experienced or gone through an emergency?
15. Do you have a contact of urgency and how to reach them?
16. How you keep a record of any allergies or medical condition?

PARTICIPANT OBSERVATION

Participant observation study is a useful technique for identifying the values and goals that people have. It provides the most valuable insight for designers. Different people have different ways of doing a task, so it is important to observe a different number of individuals to get a picture of how people do the task.

On observation, many people make it a habit of taking medicine before their meal or after their meal. They associate consuming drugs with their everyday diet and make it as a reminder. A few of them who phase difficulty in remembering to tend to use reminder apps or checklists to keep track of it. Most of them store their medicines on bedside tables and bathroom cabinets for easy access and reachability, but this doesn't guarantee that they consume their medication without fail. It is noticeable that a lot of people store medicines in pillboxes which have partitions for each day of the week to keep track of the dosage they are consuming and to avoid the confusion if they had taken the dosage or not.

PERSONAS:



Goals

- To Become CEO in her company

Hobbies

- Playing Golf
- Reading Books
- Writing Articles

Dislikes

- Unhygienic Restaurants
- Rash Driving

Likes

- Opera Music
- Pets
- Social Media

Name - Kara Green
Age - 39
Work - Assistant Vice President
Family - Married, 1 daughter
Location - High Point, NC, USA
Education - MBA from Duke University
Areas of expertise - Marketing, Supply chain management

Bio -

Mrs. Kara Green is assistant vice president at XPO Logistics, she is married and has a daughter of age 10, her visionary is to be at least in the top 5 most powerful people in her company, she always tries to eat healthy and be fit by working out in gym and do yoga everyday with her colleagues, kara always feels that training and exercising with her colleagues gets her motivated and for her yoga is the key towards mind controlling. she was always finding techniques to take her daily insulin dosages on time and even remind her daughter to do so , but all tech she used so far was not so useful for her as she forgets to use those tech on time .

SCENARIO:

One Monday Kara Green skipped her breakfast as she rushed to work after feeding her daughter and dropping her off at school. Later that day she realized that she had forgotten to take her morning insulin dosage. This was not the first time she failed to remember about consuming her pills. In spite of taking medications ever since she was diagnosed with diabetes, she still hasn't found a way to remind herself to take pills moreover skipping a meal during the day makes her naturally forget to take the medication. She has tried to keep track of her intake by creating checklists in her notepad at home and also stuck notes on her fridge at home and office desk to help her remind to take medicines. Sometimes her daughter tells her to take pills, but it 's hard to reach her during working hours, and hence none of these measures fully helped her in consuming medicines without fail.



Goals

- To Stay healthy and avoid frequent hospital visits, "because health is wealth"

Hobbies

- Reading Law related books
- Current Affairs
- Badminton

Dislikes

- Boxing
- Drugs
- Corruption

Likes

- Eating Healthy
- Disciplined men
- Family get together

Name - Kalmanje Jagannatha Shetty

Age - 78

Work - Former judge of Supreme Court of India

Family - Married, 4 Sons and Wife

Location - Bangalore, India

Education - Has master's degree in law from osmania university.

Area of expertise - extensive practice in all branches of law and in particular, Civil, Service and Constitutional matters

Bio -

Mr. Justice Jagannatha Shetty, retired supreme court judge has visionary goal of staying fit and healthy even at late 70's age, after retiring mr.shetty does separate law checks for many firms, he gives frequent visits to civil services department in Bangalore, owing to his busy schedule he misses spending time with family especially with his grand children's. Shetty always feels serving government should be his first task in his life. He maintains a pill organizer water bottle but the problem is sometimes he doesn't find that bottle on time as he couldn't carry it along with him and the bottle doesn't even have any reminder system.

SCENARIO:

Kalmanje Jagannatha Shetty was heading back home from the neighborhood park after his evening walk. Once he reached home, he mowed the lawn and took out the trash, after a productive day he came back to his bedroom and started reading a book about environment law firms. As he was reading his book, he felt an abnormal sensation in his stomach. Mr.Shetty has never experienced any discomfort in his stomach recently and doesn't have any serious medical condition. He tried to relax his body and drank plenty of water, but the sensation started to grow and began to hurt him. He observed the pain and began to panic as his family was not yet home from work. He was confused about the sudden pain and was doubtful if he should call for emergency or contact his family members to attend him. After suffering a couple of minutes, he realized the pain was not fading, he called his son at work and informed him about the situation. Mr.Shetty was then taken to the nearby hospital by his son after an hour and was diagnosed.

Many old age people like Mr.Shetty are unaware about how to handle the emergency medical situation and delay the immediate care that they require. It is important to address this issue and incorporate an emergency alarm in our design for users from any age group to use with ease.



Goals

- To Be a Professional IFBB PRO body builder and participate in Mr.Olympia

Hobbies

- Playing Football
- Arm Wrestling
- X box

Dislikes

- Recreational Drugs
- Traveling in bus

Likes

- Road trips
- UFC
- Sky diving
- TV shows

Name - Sunny Sharma

Age - 32

Work - Fitness trainer, Dietician and professional body builder

Family - Married

Location - Delhi, India

Education - BBA from Delhi University

Area of Expertise - Personal Training, Diet Planning

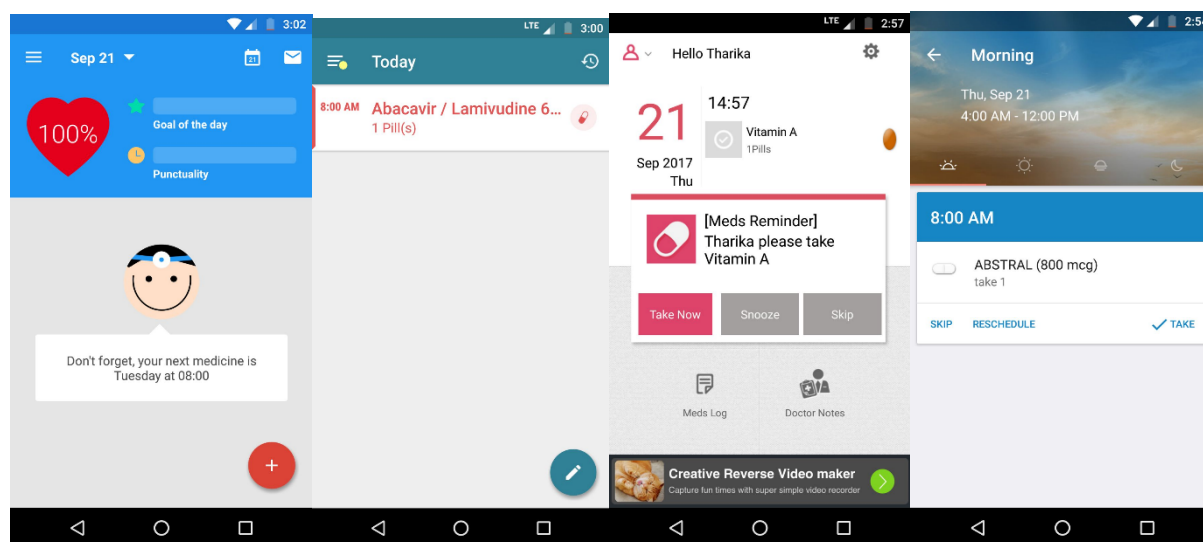
Bio -

Sunny Sharma is a professional body builder and athlete, Body building was always been a passion for sharma, he has a dream cum visionary to participate in Mr.Olympia by 2022. He loves what he do and he is very confident of making his dreams come true. He even trains bollywood actors like arjun rampal and ranveer singh . During Body Building competitions he has to take many supplements in form of powder/tablets many times a day like multivitamin tablets, bcaas, fat burner pills and other supplements.

SCENARIO:

Being a gym trainer Sunny Sharma is conscious about his health and fitness hence he keeps track of all his diet and supplements plan seriously. He uses CUCO health mobile application to record his daily calorie intake and also sets reminders for his supplements intake. The application notifies him three times a day on consuming supplements. Sunny ignores these notifications when he is busy training people in the gym, or he tries to turn off the reminder. Sometimes he records the intake even if he hasn't had, thinking he would consume it later that day. There have been many times where he had skipped his pills; this frustrates him. The reminder app is not sufficient for Sunny to achieve his goals and he is unable to track his workout routine and timings.

EXISTING SYSTEM:



(a)

(b)

(c)

(d)

The above are the screenshots from existing medicine reminder applications. (a) Medisafe Meds & Pill (b) MyTherapy (c) Pillbox (d) CUCO Health

The comparison of the four applications

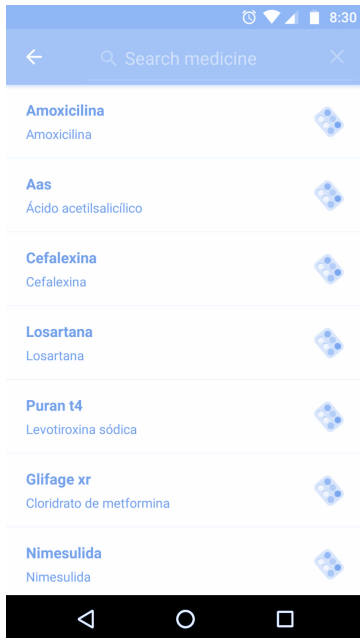
Medicine app	Cloud data Storage	Database of Medicines	Tracks missed and taken doses	Multiplatform app	Multiple profile capability	Importing Medicines
Medsafe Meds	X	X		X		X
My Pillbox		X				
My Therapy		X	X	X	X	
Cuco	X	X		X		

The advantages of existing systems:

1. All applications have a database of medicines. It is easier to choose the drugs when the dataset is readily available.
2. One of the applications has tracking of missed medication, which is a very good. The perfect feature for people who forget to take medications.
3. Almost all the application were Multi-platform. This will make sure the application can be used on any mobile.
4. Once the data is fed into the system, the data is then synced to the cloud. This can then be easily accessed from any device by logging in.
5. Any number of users can log in to the application and start using it. So, we can keep track of medications of our family.

The disadvantages we observed from the existing system:

1. The application can't track if the user took medicine for real. There will be cases where the user hits the "Taken" button but won't take medicine.
2. The application did not provide sync/export/print data facility of the medications.
3. The statement about the compliance of HIPAA (Health Insurance Portability and Accountability act of 1996) law is not provided in the applications.
4. The applications were not Multilingual. Most of them offered only English as a language.



This is the screenshot of the CUCO Health application. We can observe that any medicine is not given the contents. A drug tracking app should be more specific about what are the contents and what is their composition percentage. This will help the patient to decide about the medicine, particularly if he/she has some allergies.

DATA ANALYSIS:

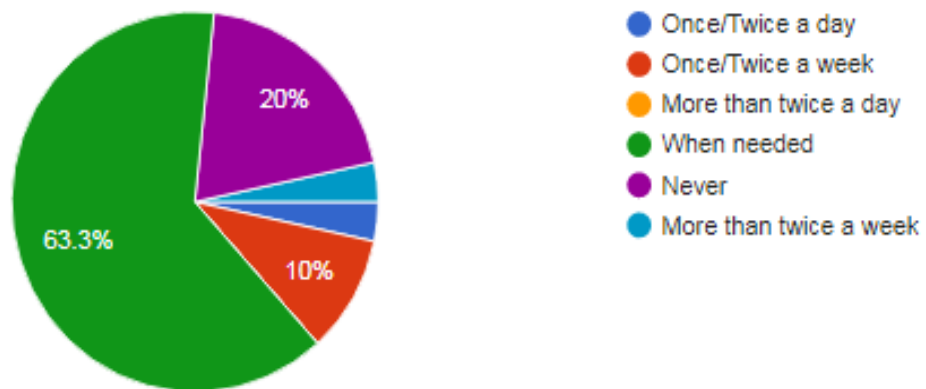
It is important to analyze the data gathered from the need-finding techniques to learn about the user's goals, values and come up with design insights. The primary purpose behind conducting an online survey is to gather data from a wide range of audience. On receiving over 50 responses from different age groups, professions we identify how different people manage their medical situation. The general idea we can infer from this is that people require some form of reminder to help them keep up with their prescribed medication.

From the interviews conducted we have gathered data that acknowledges the need for identifying if people are consuming the correct medicine and dosage. We came across several of our interviewees describe an emergency situation which was caused due to older adult's inability to self-manage their prescription medications at home. And we have also identified that even individuals who consume medicines on a regular basis tend to forget taking medicines, the data acquired from volunteers who agreed to an interview

LEARNING FROM THE SURVEY:

How often do you consume medicines/supplements?

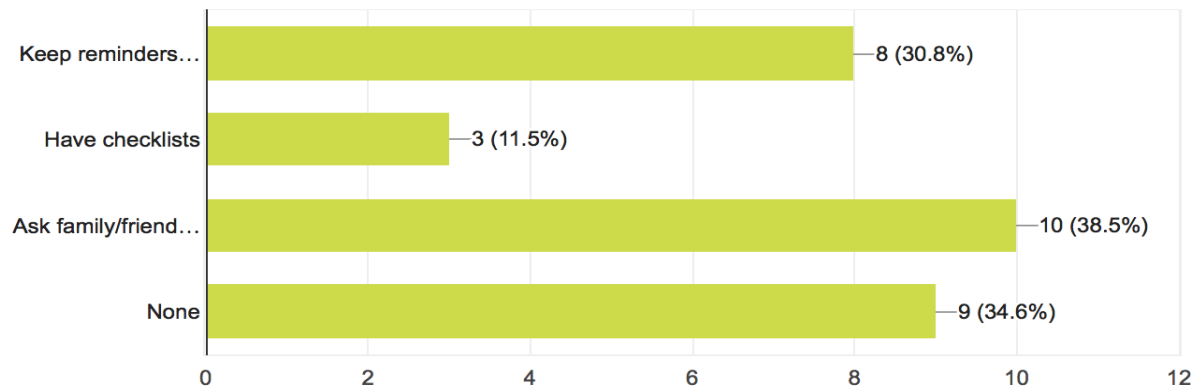
30 responses



The data received from survey showcases that majority of 63% users use medicines when required, and around 10% take weekly prescriptions, and 20% of people don't consume pills at all, and 7% of individuals regularly consume who are our targeted users

How do you remind yourself to taking the medicines/supplements?

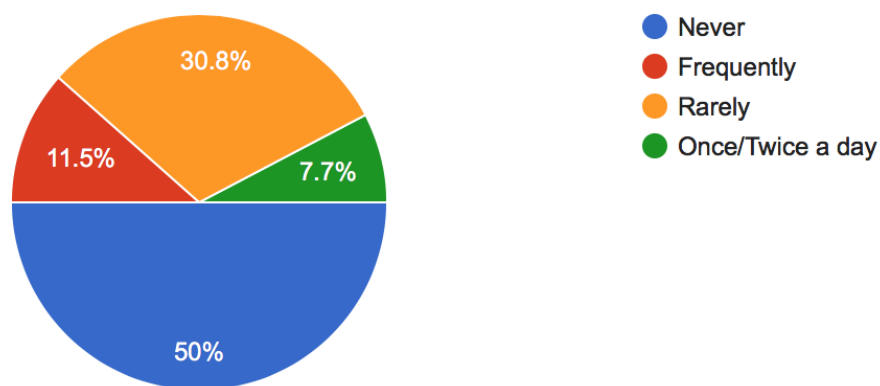
26 responses



From the above bar graph, it is easy to see that majority portion (38.5%) of the users rely on third-party (family/friends) to remind them to take medicines. This might be because all the applications in the market have their limits when it comes to appropriately suggesting a person and providing surety for that user that he/she will take medicines for sure.

How often do you forget to take your medicines/supplements?

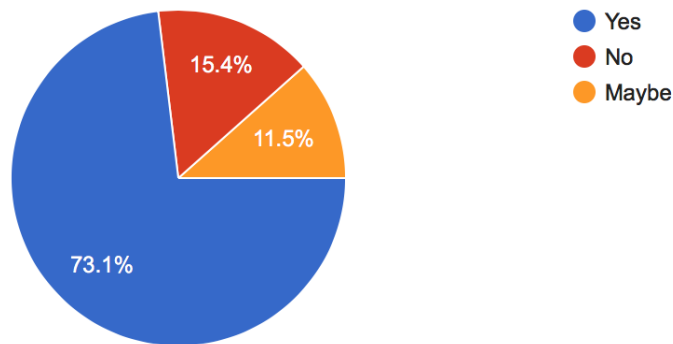
26 responses



From the above pie chart, we can predict that 50% people somehow forget taking medications and other 50% were sure that they take pills on time.

Do you think a reminder app would help you take medicines/supplements without missing them?

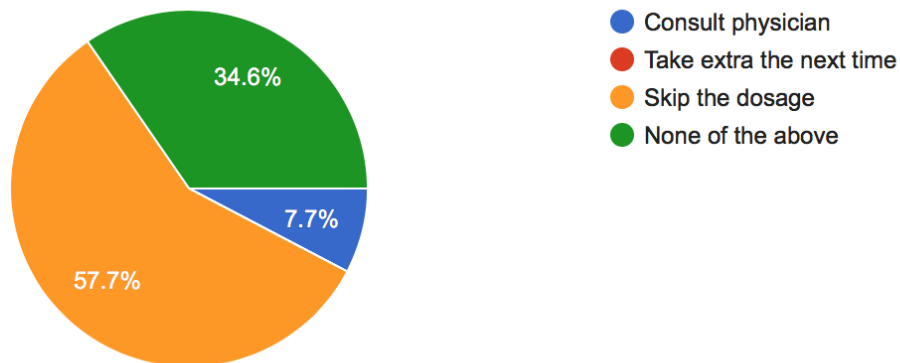
26 responses



From the above pie chart, we can interpret that about 85% people at some point in time if they are going to take medicines then a reminder app would help them to take pills/supplements without missing them.

What do you do when you forget to take medication/supplements?

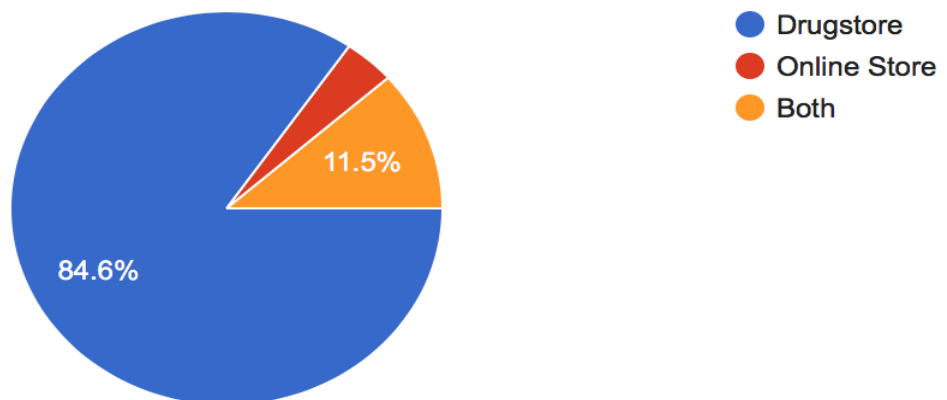
26 responses



From the response received it is evident that even people who don't take medication on a regular basis need some reminder to consume it on time. The majority of citizens prefer to use a reminder to keep them posted. The result shows that most of them have difficulty in contacting their physician and hence choose to skip the dosage when they forget to take.

Where do you purchase medicines/supplements?

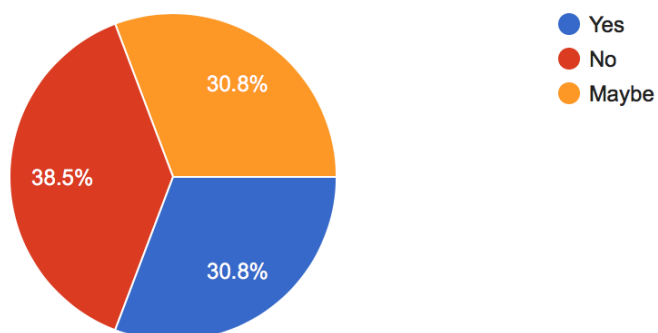
26 responses



The above pie chart conveys that drug store is the most common place for purchasing drugs and other option provided by a minority is buying online, and some percentage of people prefer both methods for buying medicines/supplements.

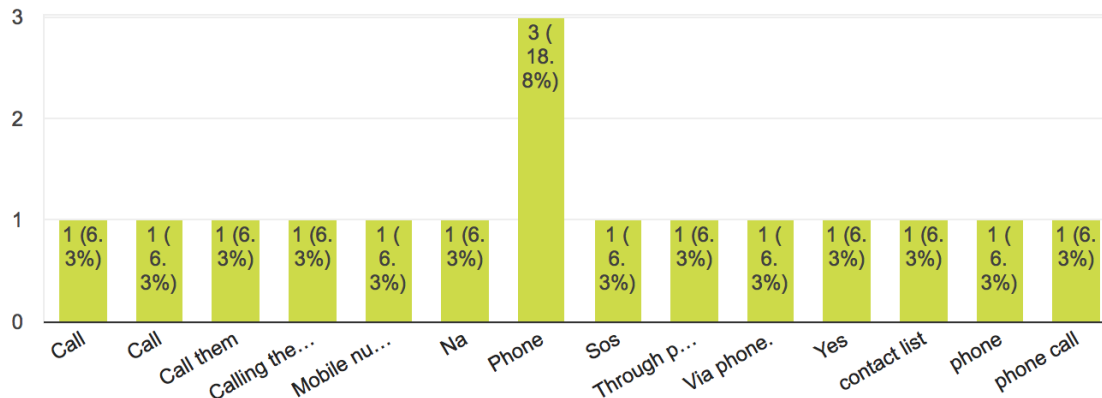
Would you like to automatically repurchase your medicines/supplements?

26 responses



How do you intent to reach your emergency contact in case of emergency?

16 responses



Majority of the users either want to automate purchasing or are willing to try a new system. Therefore, it is essential to develop a convenient system for the user to restock their prescribed medicines as they desire automatically. People store their emergency contact in their phone and hope to contact them through their phone. Hence creating a system to manage emergency using a mobile phone is needed.

LEARNING FROM INTERVIEWS:

1. Participants like to have easy application control via voice recognition.
2. Participants were more excited about multiple reminder functions where they can remind someone of their family from their smartphone.
3. The existing application is not tablet friendly; they have problems viewing the same request in tablets.
4. Few Reminder applications had problem syncing with the calendar, they can set a reminder for today tomorrow or this week, but if their medication is going to start next month, so to add it for next month or next quarter of the year they couldn't find proper syncing in the current application.
5. From the responses collected, we learned that most of the participants were willing to have additional features like voice control, cross-platform compatibility, free application in store and very less to none advertisements in the app.
6. Participants Like to have an ability to sync the reminders to the cloud so that if they change their phone or add a different device to their current list, they don't have to set reminder again; the same thing should be synchronized automatically on other devices.

7. Based on the responses, we found that participants were only willing to share their data with whom they wanted, explicitly restricted to how they like to share, doesn't display contents in social media.
8. Results showed that few of the participants found their application's UI was not so user-friendly.
9. Few participants felt that their application did not track reminder according to different time zones, like for frequent fliers, who travel from various country to country had their time zones changed, so they had to reset the application again and set the reminder, application should set further alarms/reminder according to the time zone gap from default time zone
10. Participants found that if they get their online medicine ordering portal linked with the application and have an auto-pay option for the payment, then it would be beneficial.

DESIGN GOALS:

Analyzing the data gathered from the online survey, interviews and participant observation, the following needs were identified:

Pain Point 1: Application don't have facility for emergency contact

Design Goal 1: The application should provide emergency contact service- Hospital, Ambulance, Doctor or Family. The application will feature a button of urgency. This button will alert all the pre-entered emergency contacts.

Pain Point 2: Application can't track if the person took medicine for real. This is just by the notification and decided wholly based on user input. There will be many cases where user hits "Taken" button but forget to take medicine.

Design Goal 2: The application will be able to track if the person took medicine using NFC tags. The user just have to tap the NFC tag on the pill box to track the tablet.

Pain Point 3: Apps don't provide easy medication upload methods like taking a picture and uploading the medicines.

Design Goal 3: Provide this functionality for the more user-friendly system. This is tracked using barcode of the medicine.

Pain Point 4: Application is not able to record pre-existing diseases and allergies.

Design Goal 4: System should be able to take note of pre-existing diseases and allergies.

Pain Point 5: Applications don't have the facility to take note of side effects of medication. The side effects usually decided by the content/ composition of the medicine. The service of providing the content is not provided.

Design Goal 5: Application should be able to provide information such as "Crocin Advance Tablet is safe to use during pregnancy" or "Fepanil Tablet should be employed with caution in patients with liver disease." Application should give more precise information about the composition of medicines

FUTURE ENHANCEMENT:

Pain Point 1: Can't contact a doctor or medical practitioners from the application.

Design Goals 1: Application should be able to provide live chat option with the doctors

Pain Point 2: Applications can't track the health

Design Goals 2: System should be able to track Blood Glucose, Blood Pressure, Pain, Headache, Mood, Body Temperature, Sleep, Nausea, Weight, Seizure, Blood Oxygenation, Height

Pain Point 3: Difficult to manage medical records over the years.

Design Goal 3: Create a system that keeps track of user's previous medical records.

Pain Point 4: Application is not able to subscribe for repeated ordering of medicines

Design Goal 4: Designing a system to provide this functionality.

USABILITY GOALS:

- Ensuring that user doesn't miss dose using NFC (Near Field Communication) technology chips on the pill box .
- The interface should be easy to use.
- The pill reminder should push the user to take the pill
- Availability of information about the side effects and alternative medicines.

INSPIRATIONS:

- There are no contacts for an emergency. This is the most important thing required in case of urgency. There was no one pushes button to alert all the contacts.
- People felt it difficult to track the pills. It is hard to track whether the individual took medicine or missed it. There was no summary to show the trend
- Even though people have a drug tracking application, they forget to take the medication. This can't be tracked just by the application.
- Most of the people felt it difficult to enter the medication each time they buy it.