# Need And Scope of TeleHealth in Remote Hilly Areas

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# What is TeleHealth?

- *TELE + HEALTH* = Healthcare through telecommunication.
- This establishes an instant connection between patient and physician overcloud.
- The TeleHealth system increases the efficiency of home follow-up to ambulatory surgery, improving patient satisfaction.


# Motivation

- There is a **lack of well trained doctors** in remote areas due to urbanization.
- **Unreachability during winter**.
- Unless it is a metropolitan area, there is always lack of specialized doctors in almost every place in our country.
- The COVID crisis has shown flaws in our medical system were prominently bought out.
- Noting these facts, TeleHealth looks like a better option using which treatment can be done while being at home.

# Survey

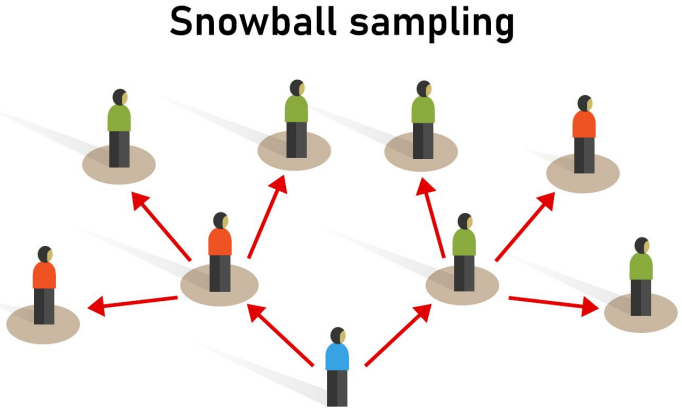
- Limited resources available due to the COVID-19.
- We could not travel to these places so we decided to conduct telephonic interviews.
- Most convenient way to conduct surveys for the locals of Lahaul and Spiti.

## Population Of Interest

- Locals of Lahaul & Spiti
- Doctors in Lahaul & Spiti

# Survey Methodology

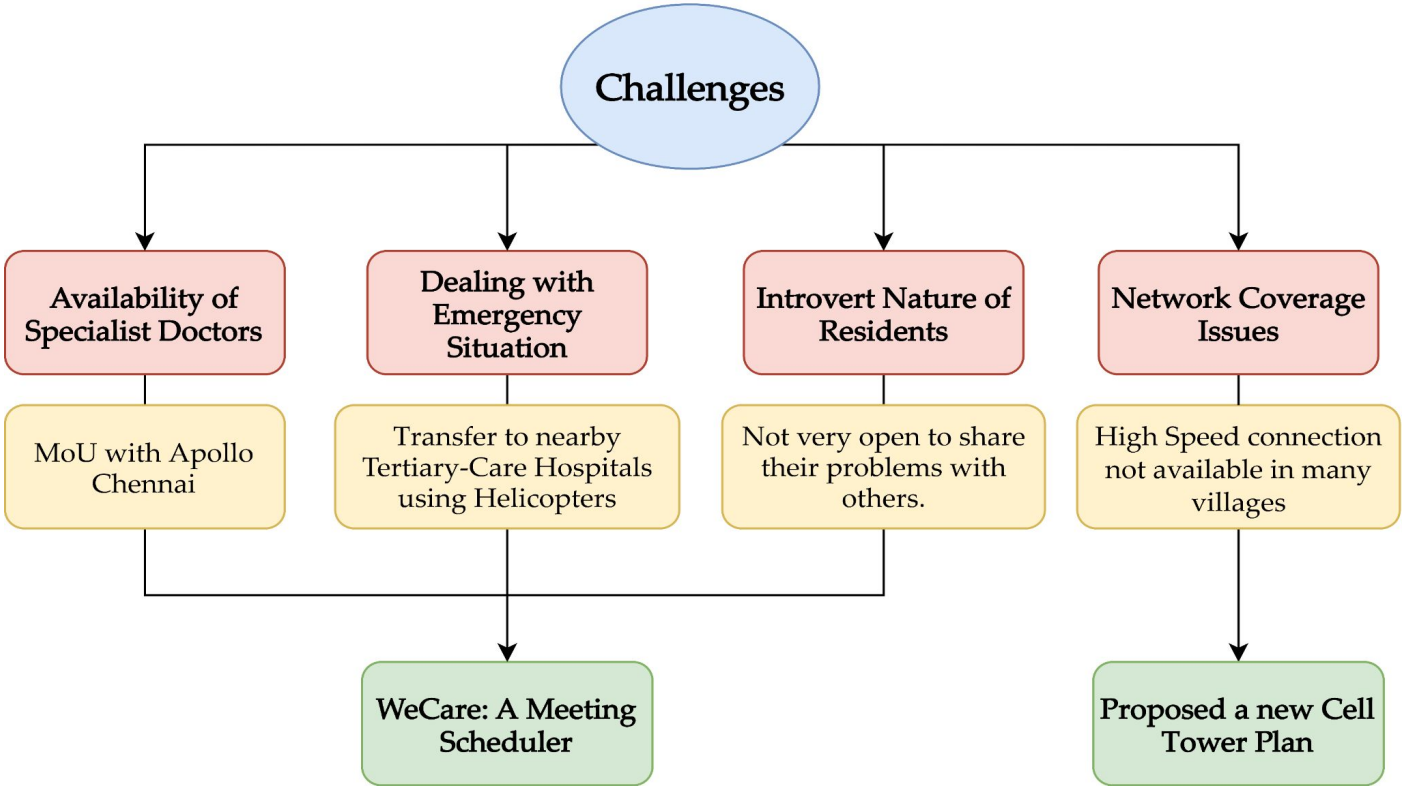
- Difficult to conduct interviews due to the sheer size of population.
- Shy nature of the remote, tribal people posed a big challenge.
- Snowball sampling method.
- Leveraged our contacts in Mandi and Kullu.
- Conducted interviews of locals after which they encouraged other locals to take part in our study.
- Best method as the population there is small and difficult to reach out.



# Data needed to be collected through Questionnaire

- The existing number of hospitals, ambulances, and health centers at Lahaul and Spiti.
- **Patient to Physician Ratio** in each sub-division.
- Current approaches/ solutions used to reach remote and non-mobile places situated in hilly areas.
- How emergencies and critical medical situations are handled?
- Do they use any TeleHealth facilities currently?
- Do they have specialist doctors at their hospitals along with required medical machinery and testing facilities
- What are the Internet Speed, Bandwidth, and coverage available to the residents of Lahaul & Spiti?

# Survey Analysis



# Cell Tower Plan for Lahaul Spiti District

- **Facts:**
  - The height of the tower can not be more than 30 meters in hilly areas.
  - Absorption of radio waves and reflection from mountains.
  - In remote hilly areas, the range can not be more than 5-8 km
  - The range of tower majorly depends upon transmitter's rated power and the frequency of signal in use.

# Cell Tower Plan

- **Assumptions:**
  - We have used the data (location of villages and population) according to 2011 census.
  - Prioritize network services to the areas which are inhabited.

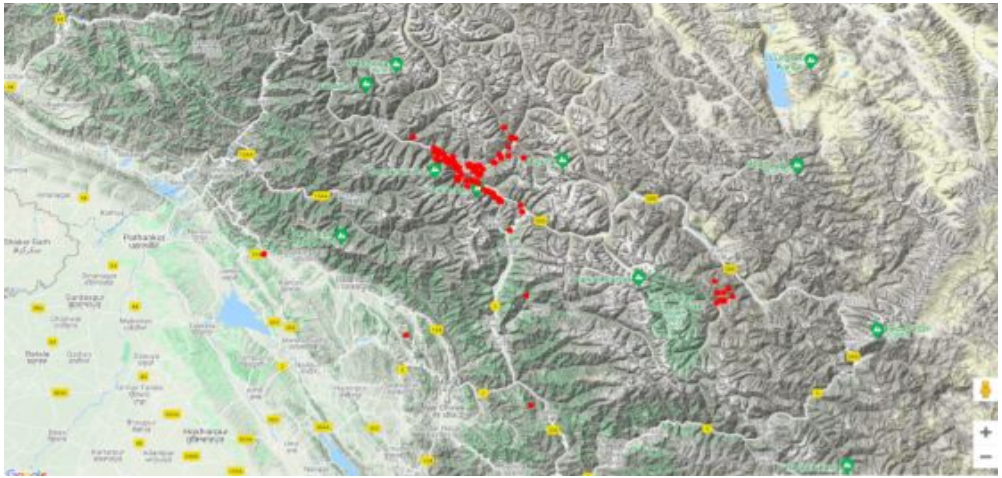
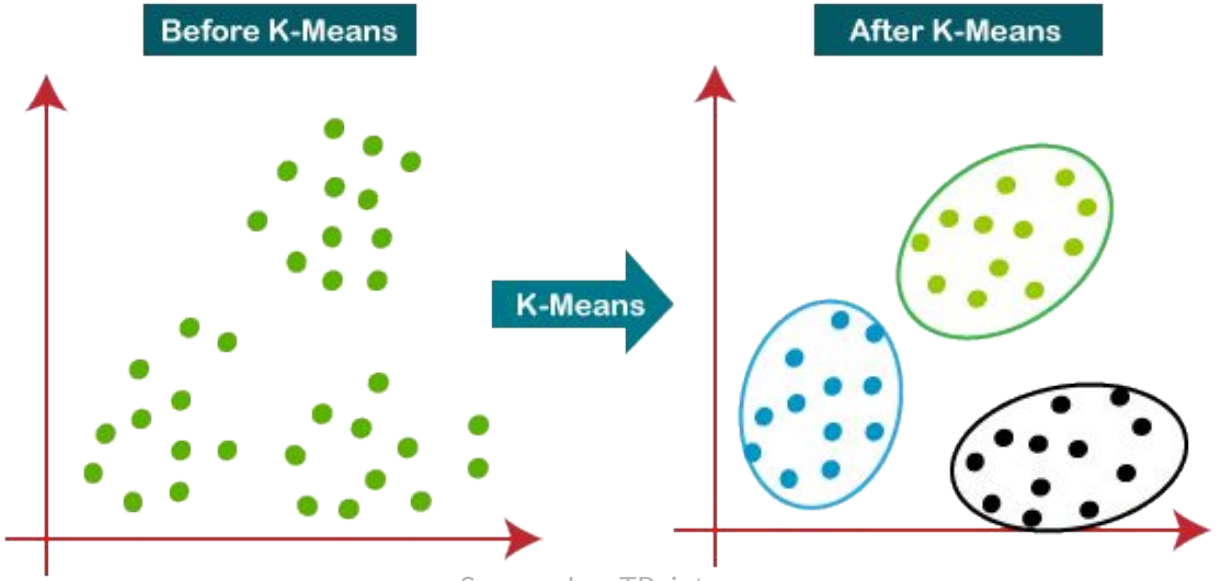


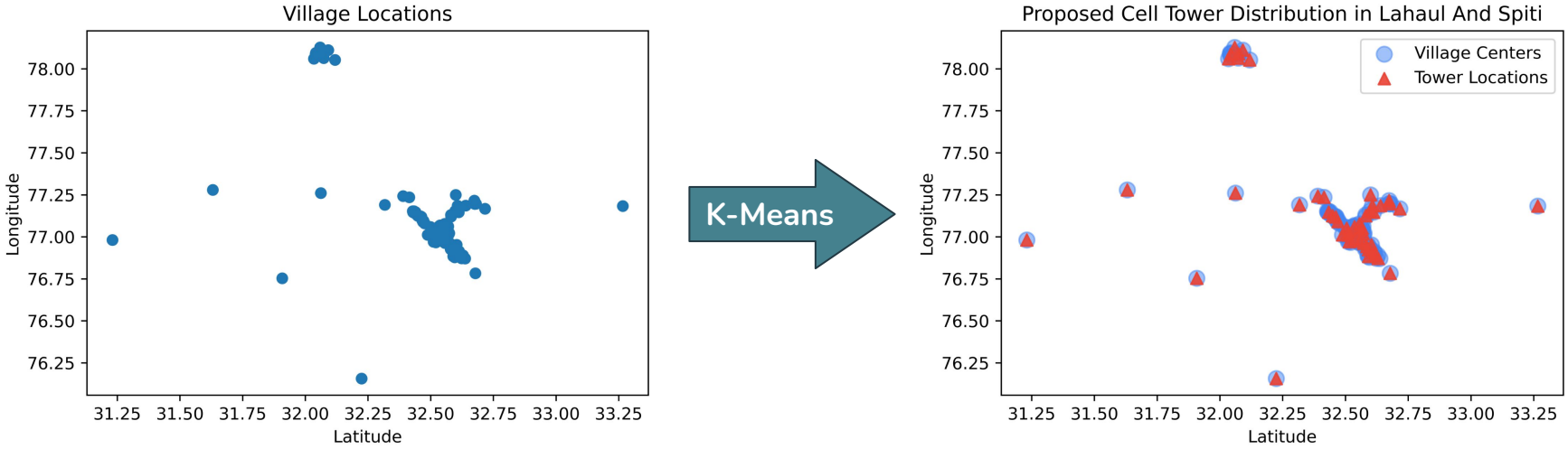
**Figure**: Location of Villages in Lahaul & Spiti pointed with red dots on Google Maps.

# K-Means: An Clustering Algorithm




Source: JavaTPoint

# Proposing Tower Locations with K-Means



# Proposed Tower Locations

- Approximately 50 towers are required to provide high bandwidth network.

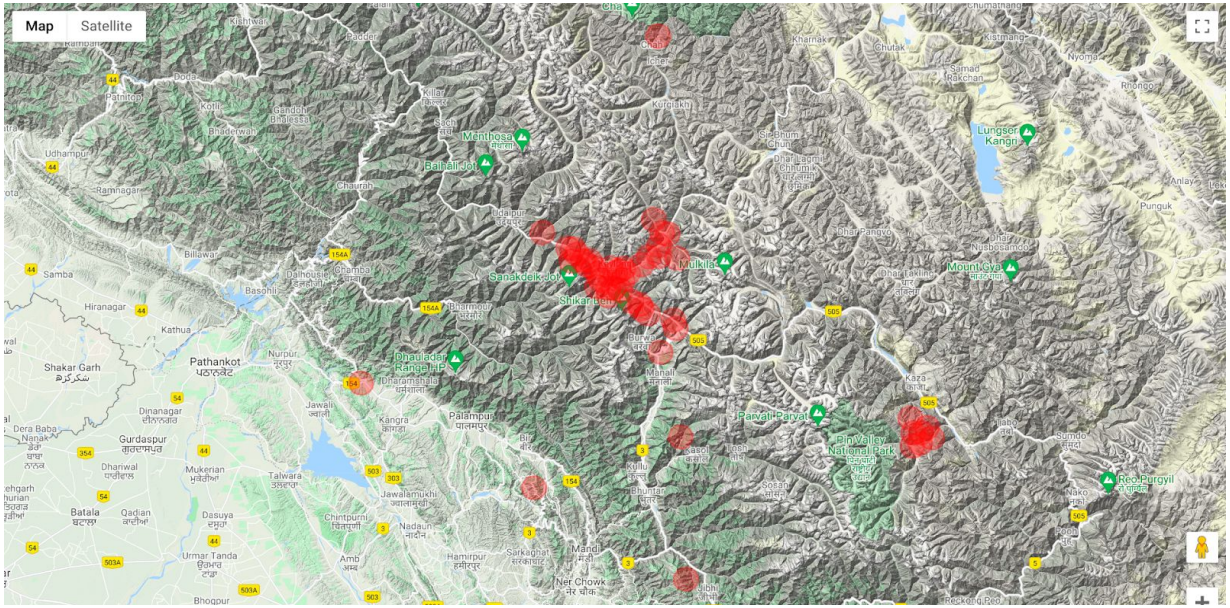
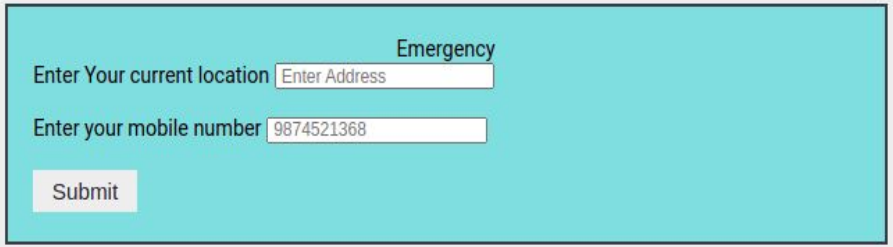


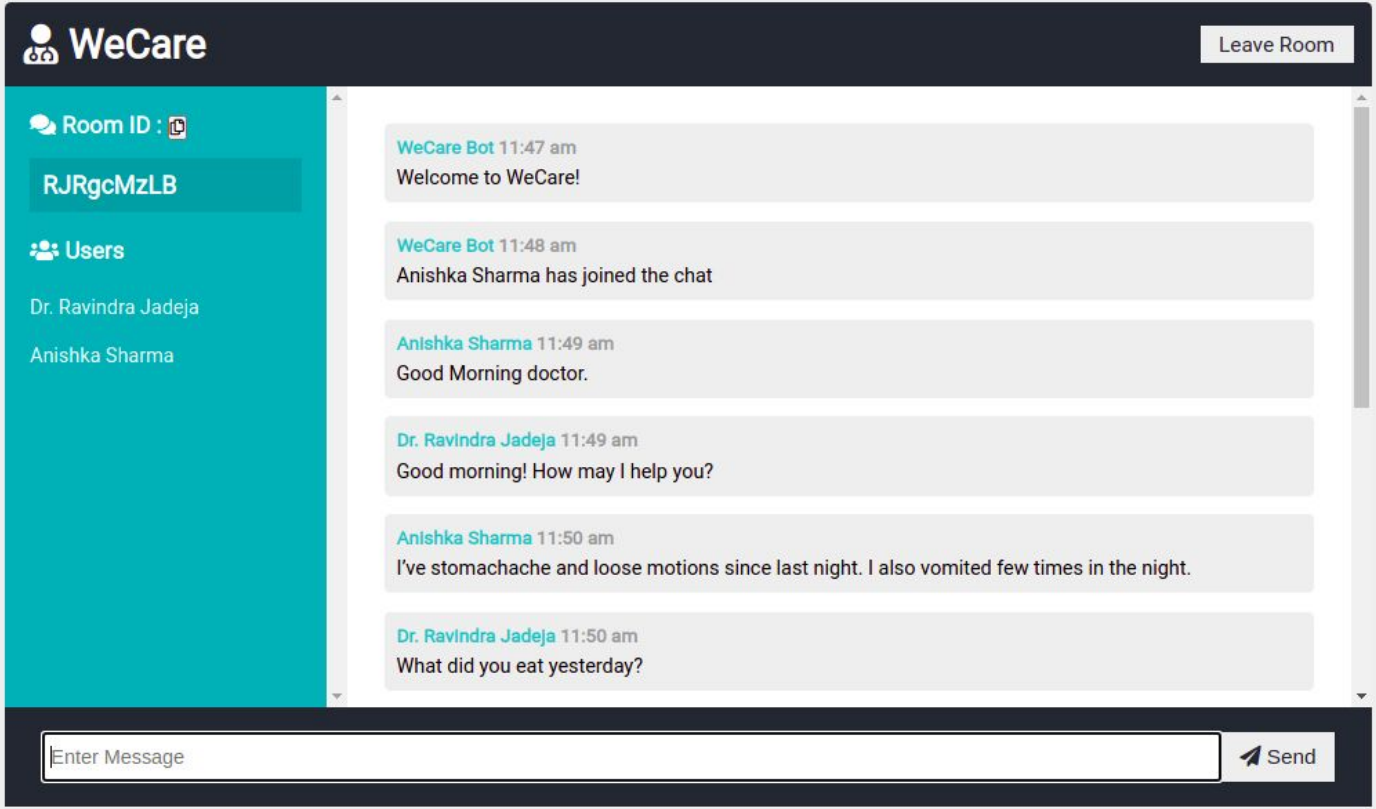

**Figure:** Proposed Tower Locations in Lahaul & Spiti with coverage area plotted with red color.

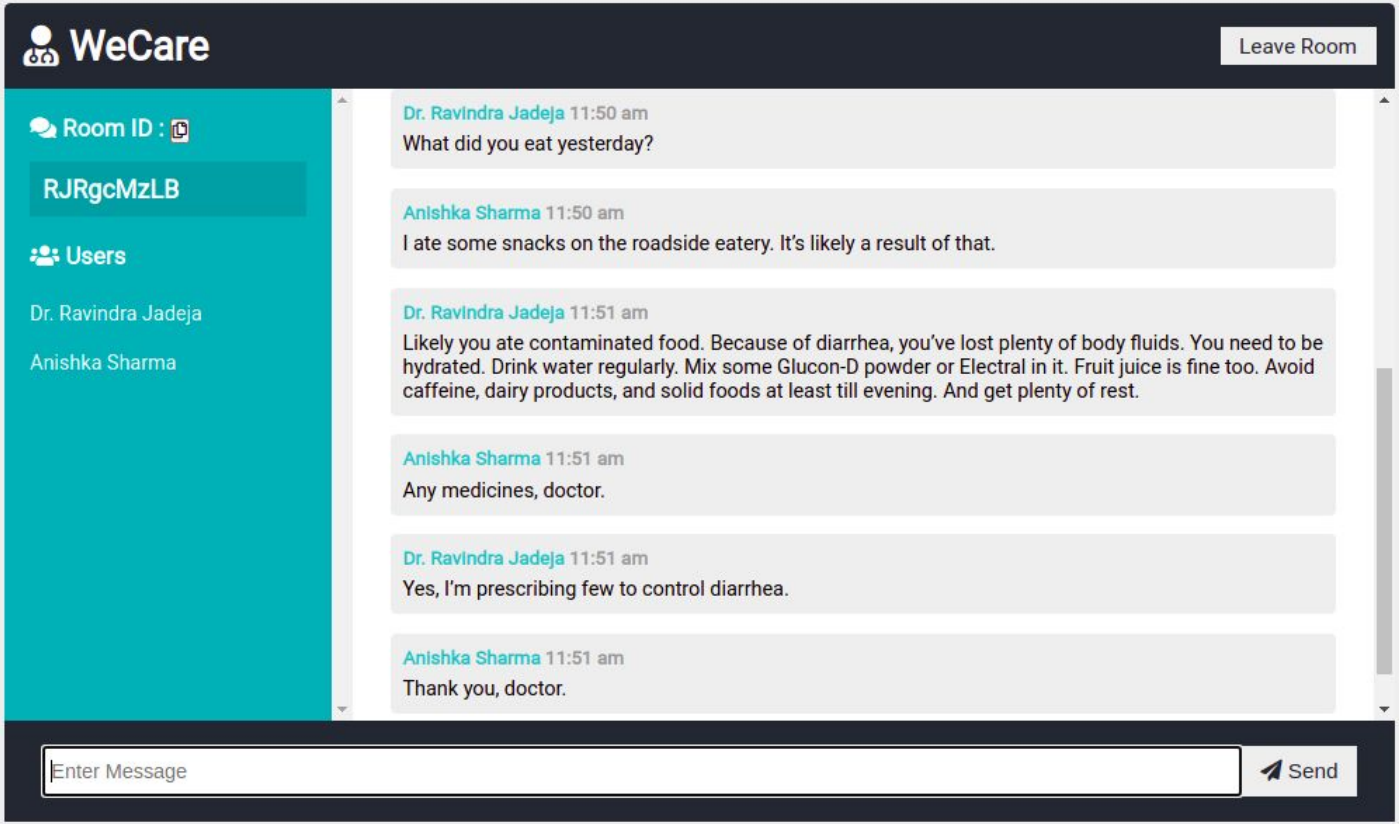
# WeCare: Connecting Doctors & Patients.

- To solve the issues of:
  - Availability of specialist doctors.
  - Dealing with emergencies.
  - Introverted nature of residents.
- WeCare
  - A lightweight and easy-to-use application interface.
  - In this, one can **connect directly with doctors** and talk about their health issues in the chat.
  - It also acts as an **emergency handling app** that would alert the authorities to handle these situations with speed and accuracy.


WeCare
Enter as a Doctor
Enter as a patient


Emergency
Enter Your current location
Enter Address
Enter your mobile number
9874521368
Submit


WeCare
Leave Room
Room ID :
RJRgcMzLB
Users
Dr. Ravindra Jadeja
Anishka Sharma
WeCare Bot 11:47 am
Welcome to WeCare!
WeCare Bot 11:48 am
Anishka Sharma has joined the chat
Anishka Sharma 11:49 am
Good Morning doctor.
Dr. Ravindra Jadeja 11:49 am
Good morning! How may I help you?
Anishka Sharma 11:50 am
I've stomachache and loose motions since last night. I also vomited few times in the night.
Dr. Ravindra Jadeja 11:50 am
What did you eat yesterday?
Enter Message
Send


WeCare
Leave Room
Room ID :
RJRgcMzLB
Users
Dr. Ravindra Jadeja
Anishka Sharma
Dr. Ravindra Jadeja 11:50 am
What did you eat yesterday?
Anishka Sharma 11:50 am
I ate some snacks on the roadside eatery. It's likely a result of that.
Dr. Ravindra Jadeja 11:51 am
Likely you ate contaminated food. Because of diarrhea, you've lost plenty of body fluids. You need to be hydrated. Drink water regularly. Mix some Glucon-D powder or Electral in it. Fruit juice is fine too. Avoid caffeine, dairy products, and solid foods at least till evening. And get plenty of rest.
Anishka Sharma 11:51 am
Any medicines, doctor.
Dr. Ravindra Jadeja 11:51 am
Yes, I'm prescribing few to control diarrhea.
Anishka Sharma 11:51 am
Thank you, doctor.
Enter Message
Send

# Conclusion & Future Work

- **Summing up, this work introduces:**
  - **Survey & Analysis** of healthcare facilities in Lahaul & Spiti district.
  - A **cell tower plan** for improving network coverage.
  - **WeCare:** An online app for connecting doctors and patients.

- **Future scope**
  - Providing healthcare during Winters.
  - Video Call feature in WeCare.
  - Machine Learning based Diagnosis facilities in WeCare.

**Figure:** Pneumonia Detection using Machine Learning Algorithms.

# Any Queries?