

Hi-low

Hypertension

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California College of the Arts



Agenda

1. What is Hypertension
2. Eco-system
3. User journey & current state
4. Pain points and Opportunities
5. Current Blood Pressure Monitoring system
6. Scenarios and Interactions
7. What it means to the users
8. Next steps

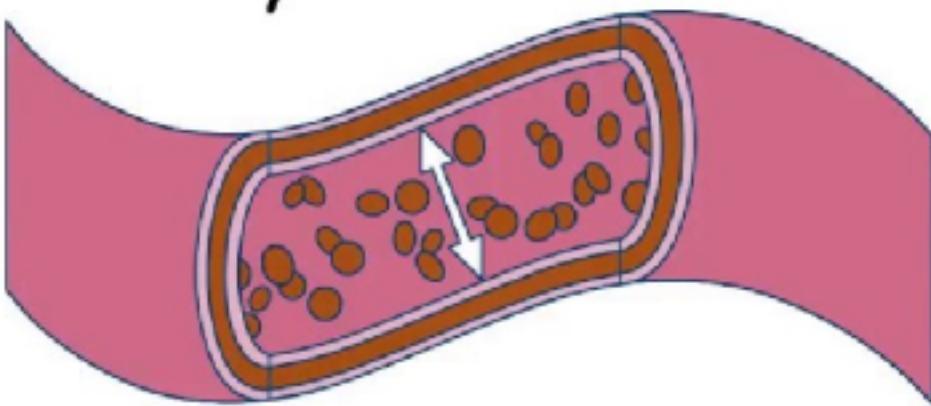
What is Hypertension

A condition in which the force of the blood against the artery walls is too high. Blood pressure levels fluctuate throughout the day and can easily change as a result of stress, physical activity and even talking.

You can have high blood pressure and experience no obvious symptoms until you experience a stroke or heart attack. In some people, severe high blood pressure can result in nosebleeds, headaches, or dizziness

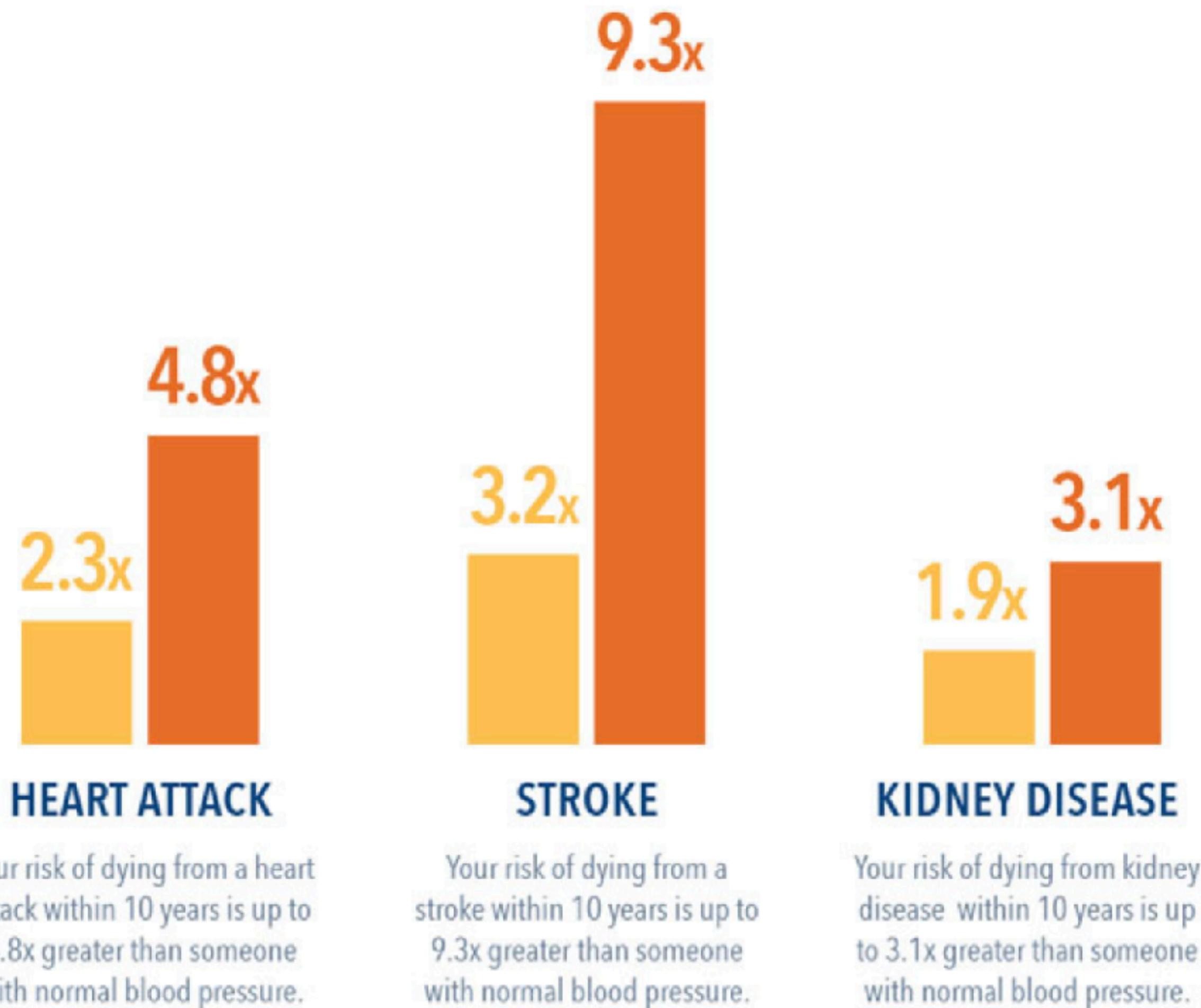


Blood pressure is the measurement of force applied to artery walls.

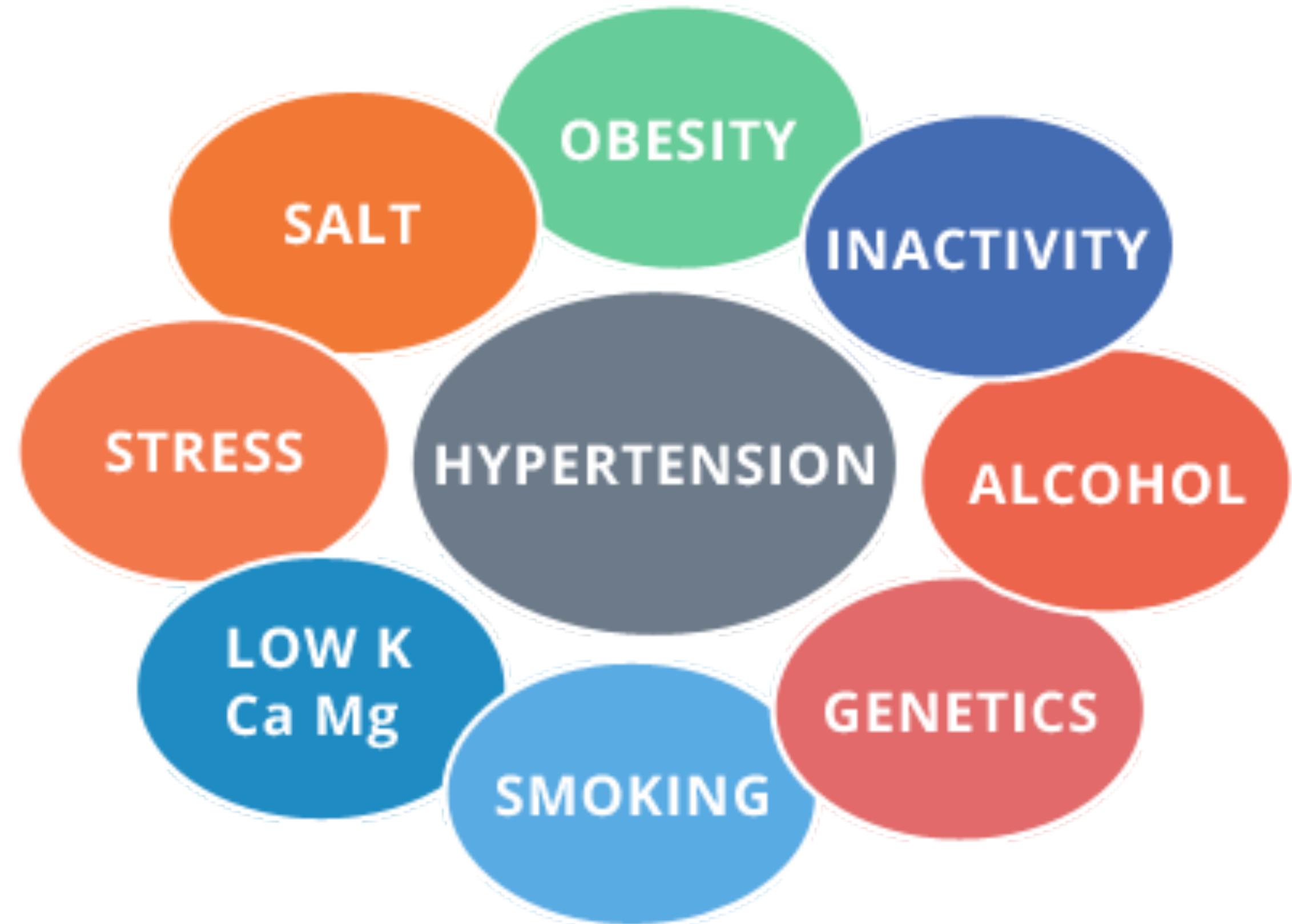


“Silent Killer”

- 1 in every 3 American adults have high blood pressure
- Every year, about 790,000 Americans have a heart attack



What causes Hypertension?



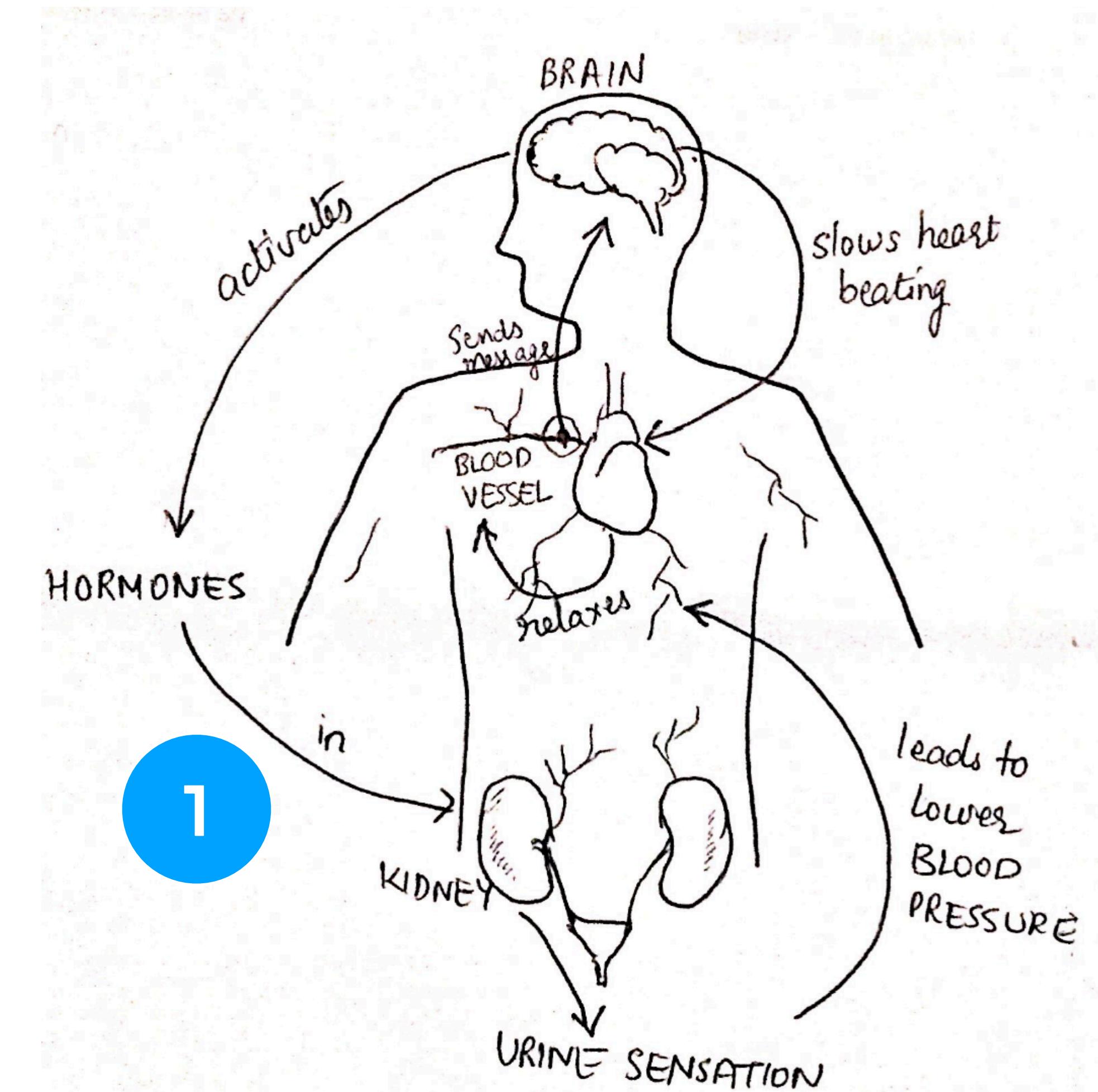
Sodium in blood

- Sodium amount has a direct impact on Blood pressure. Therefore, eating healthy food is really important for hypertensive patient
- In normal blood pressure condition, the amount of sodium in blood should be < 1500mg
- In prehypertension stage, it should be between 1500 - 3000mg



Long-term Blood Pressure Control system

1. Blood pressure changes throughout the day. It's lower when you are asleep or resting, and higher when you are active or excited
2. Your body quickly adjusts to these changes by controlling your heart beat and blood vessel diameter
3. For example, when you begin exercising, blood pressure increases. The pressure sensors in your blood vessels detect this increase and send messages to your brain to slow the beating of your heart, lower the strength of your heart's contractions and relax blood vessel walls to reduce blood pressure



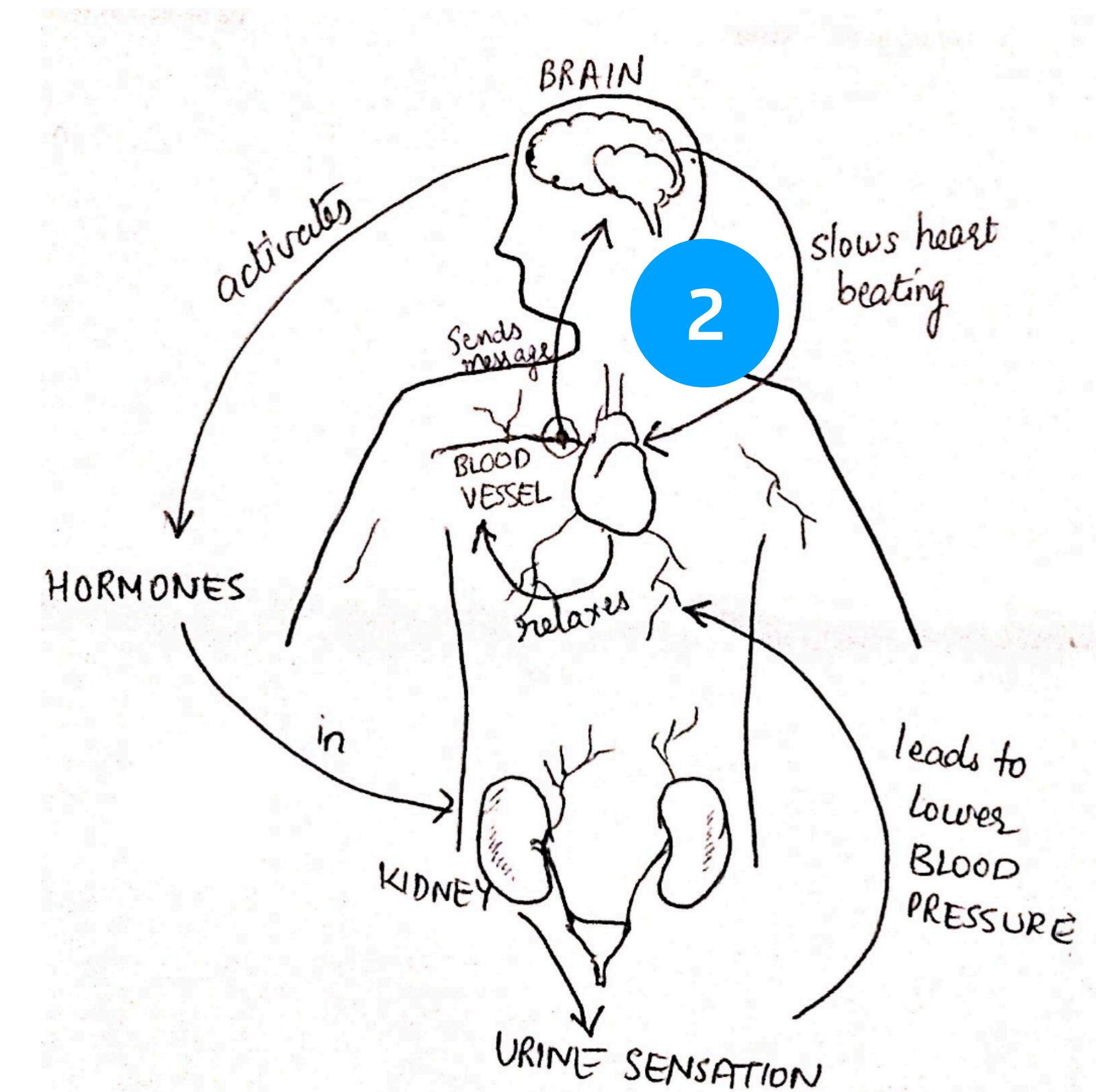
Source: <https://yourmedicalsource.com/content/how-body-controls-blood-pressure>

<https://www.livestrong.com/article/90570-body-regulate-blood-pressure/>

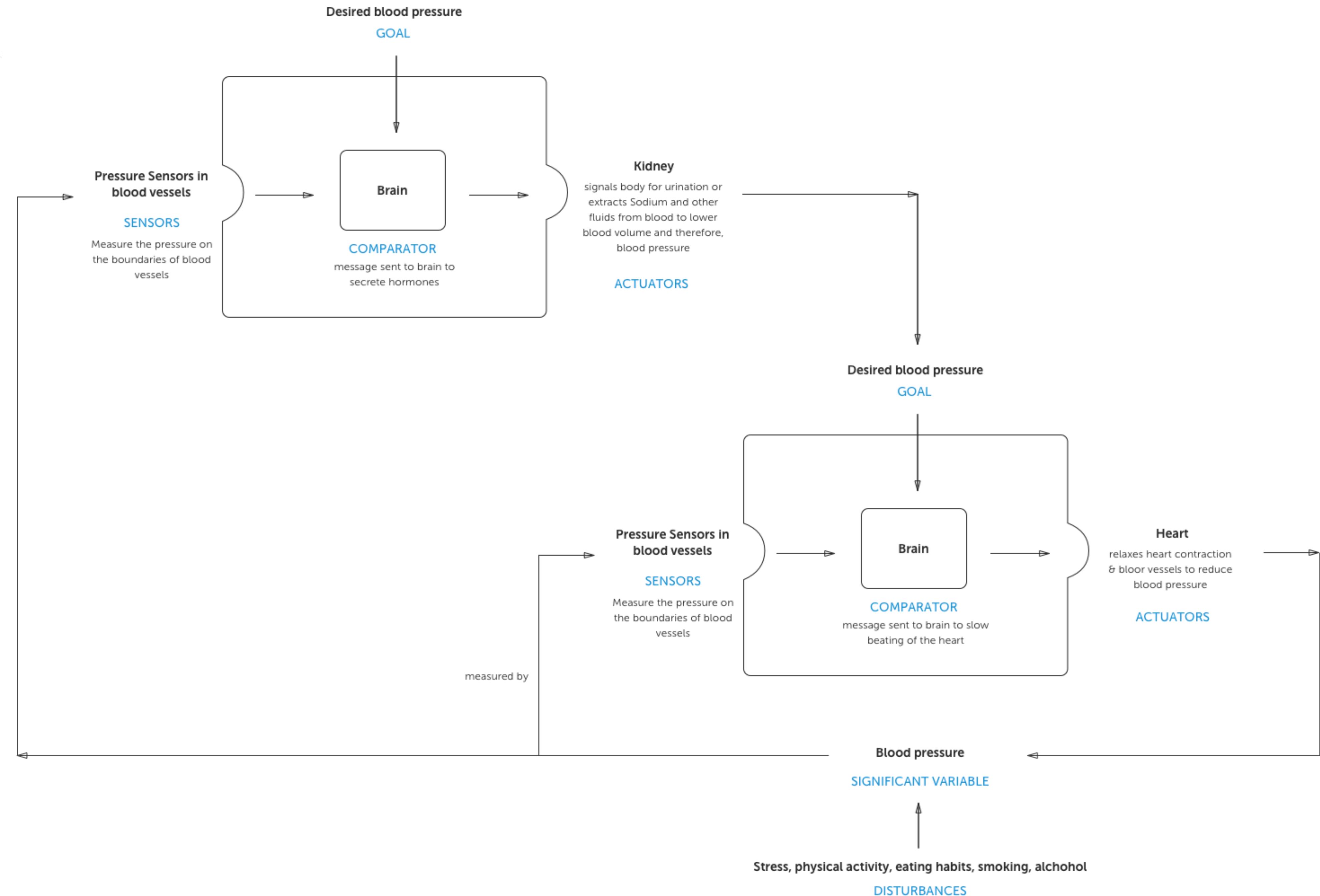
<https://www.webmd.com/hypertension-high-blood-pressure/guide/high-blood-pressure-medicine-how-can-it-help-you#2>

Everyday Blood Pressure Control system

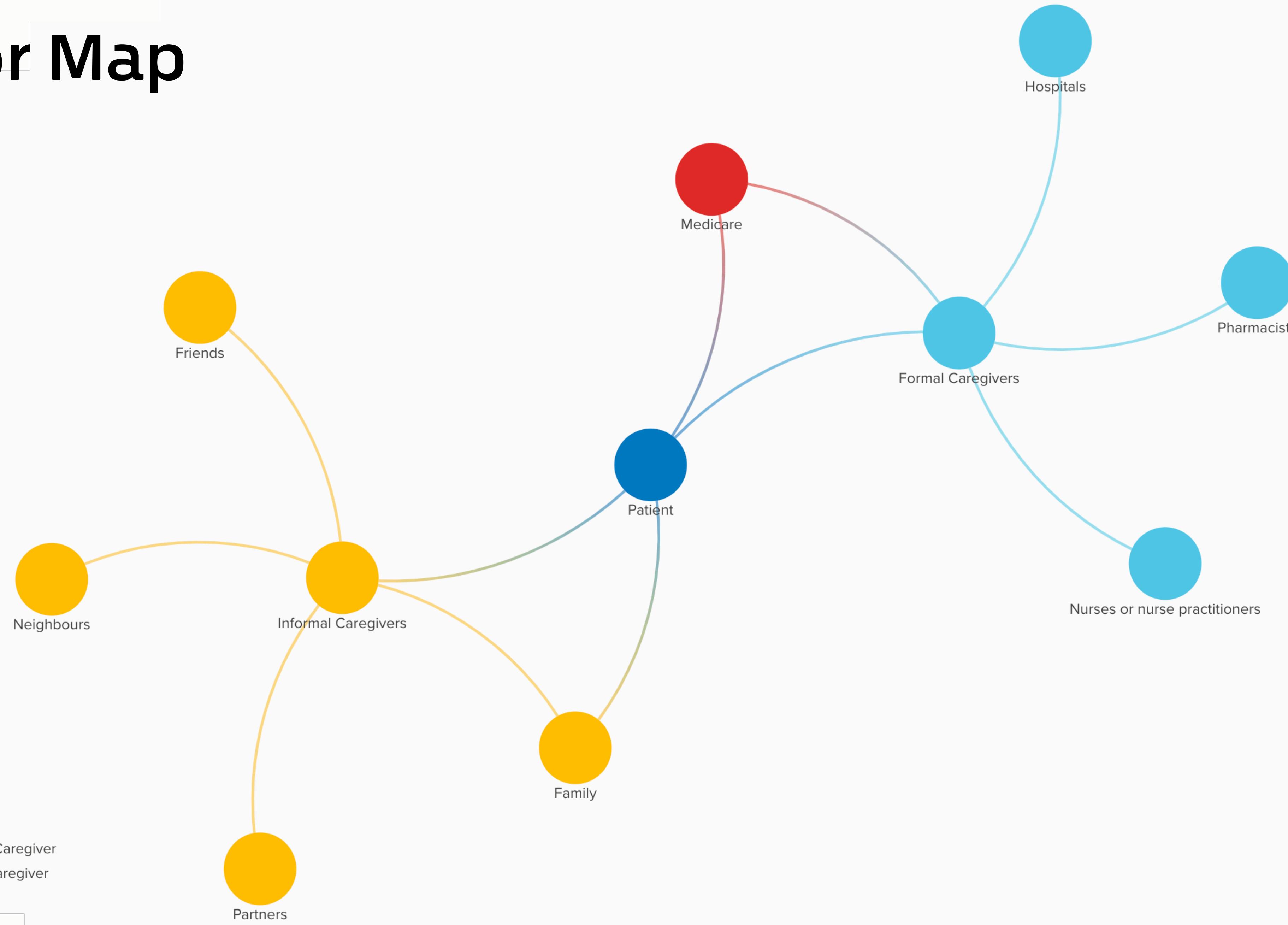
1. Over the long term, your kidneys are primarily responsible for blood pressure. In fact, many blood pressure lowering medications work by triggering the kidneys to release excess sodium and fluid
2. When working properly, this fluid regulation system keep blood pressure relatively constant over the years
3. When your blood pressure is high, hormones are released to signal increased urination, lowering blood volume and blood pressure
4. When blood volume and pressure is too low, hormones secreted from your brain tell your kidneys to retain sodium and water, increasing blood volume and blood pressure



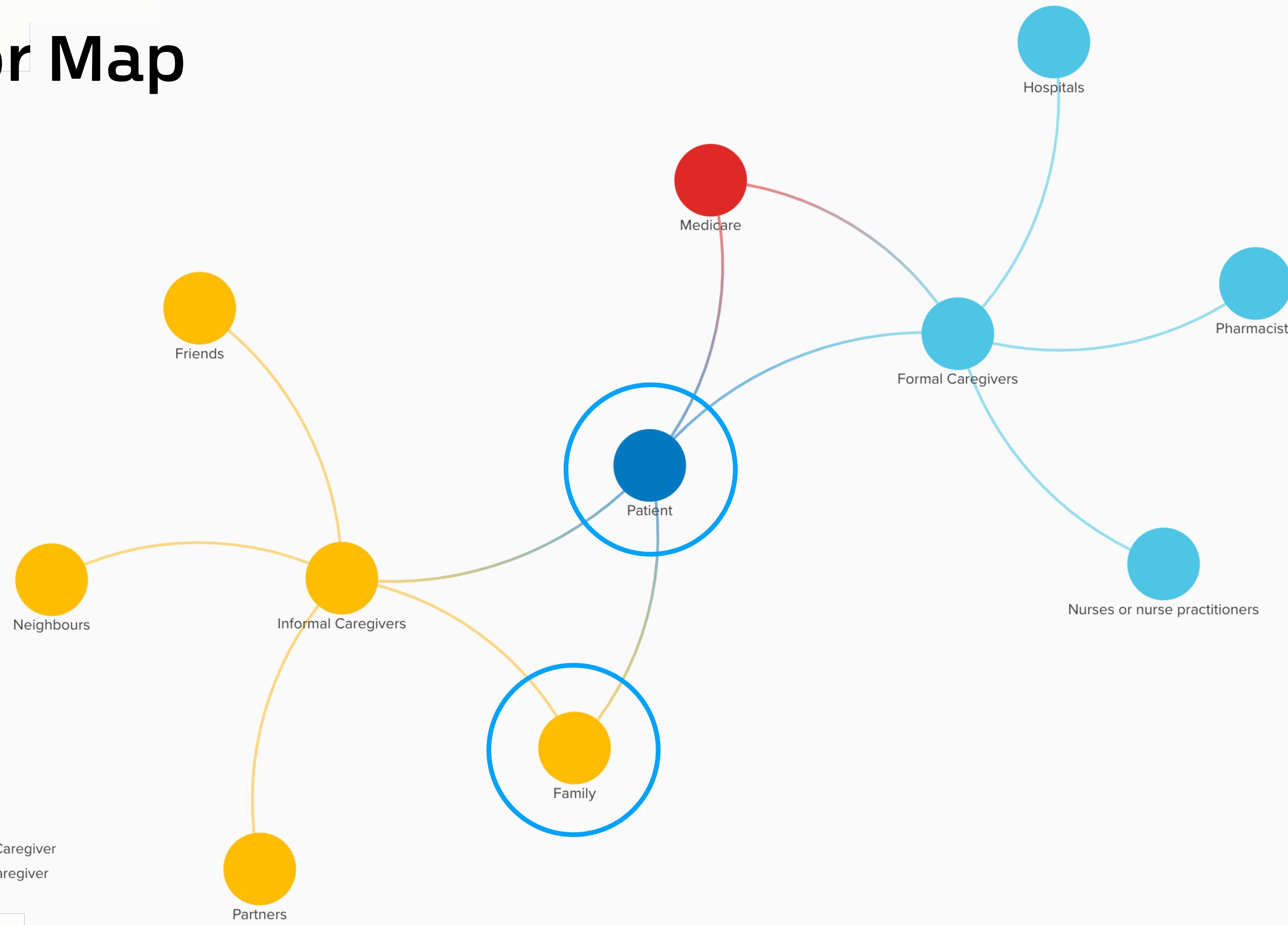
Blood Pressure Control system



Actor Map



Actor Map

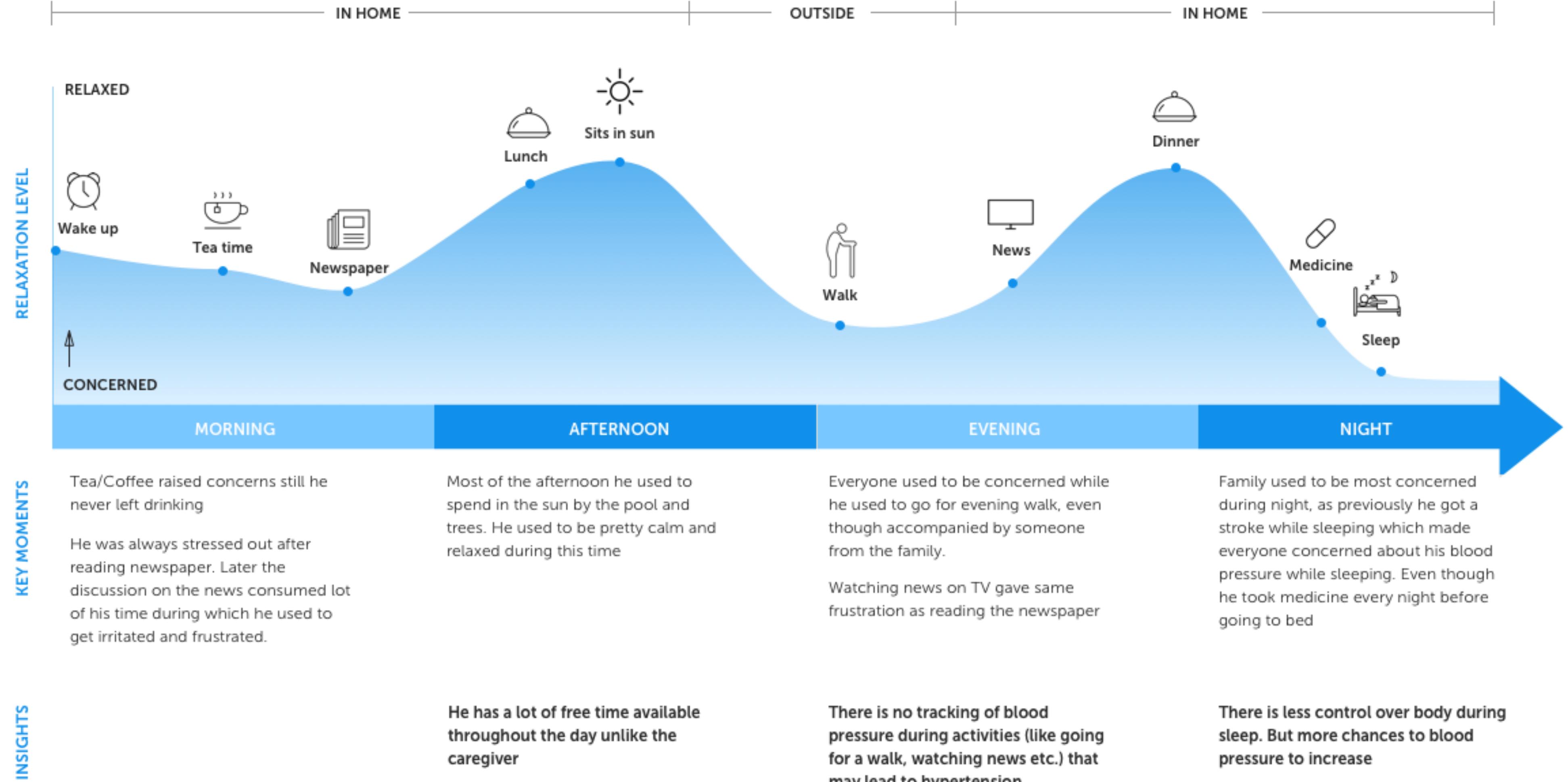


Hypertension Patient

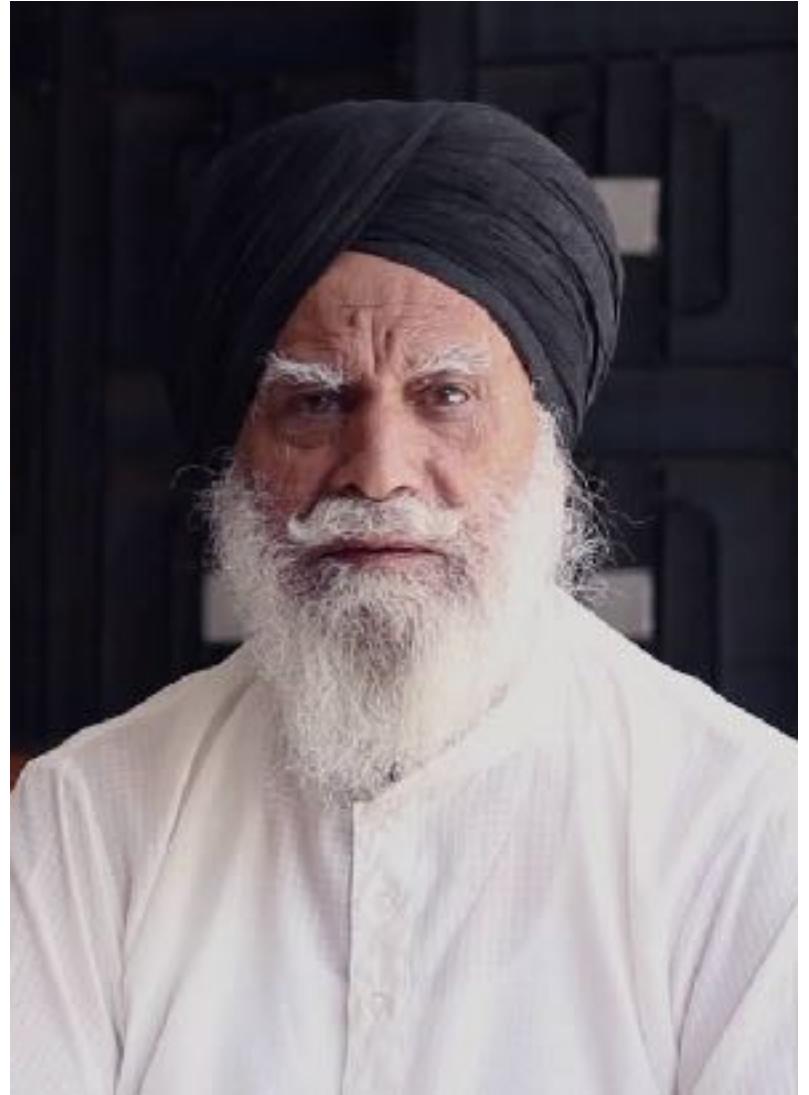


Uttam Singh

69 yrs old



Pain Points



Uttam Singh

69 yrs old

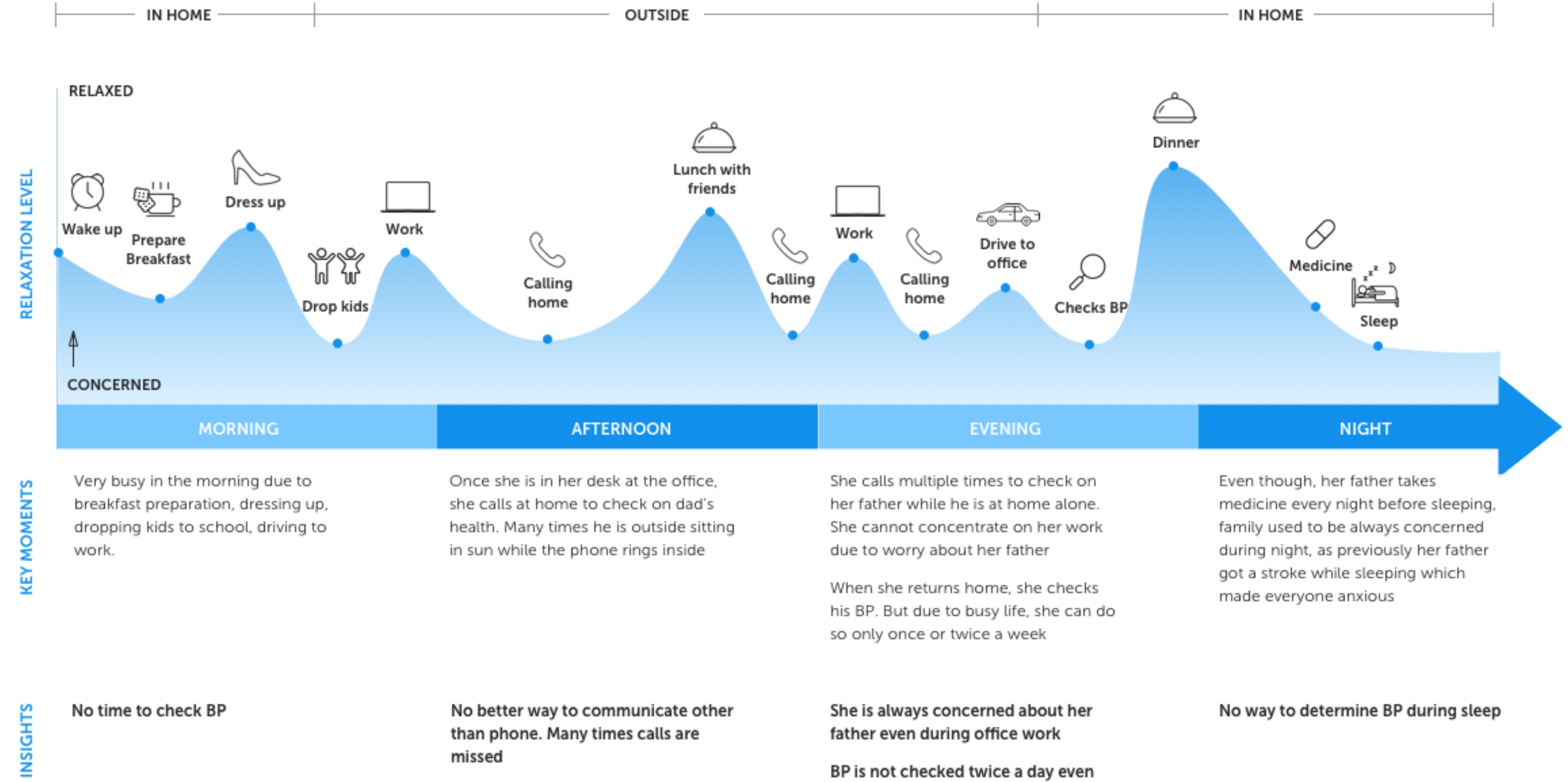
1. Don't know how to operate Blood Pressure Monitor
2. Don't know how to interpret readings
3. Feels powerless to always rely on his daughter-in-law to take care of his health
4. If possible, he wants to reduce his daughter-in-law's stress
5. Always worried that if he is doing enough to avoid high blood pressure

Caregiver



Kuldeep Kaur

52 yrs old



Pain points



Kuldeep Kaur

52 yrs old

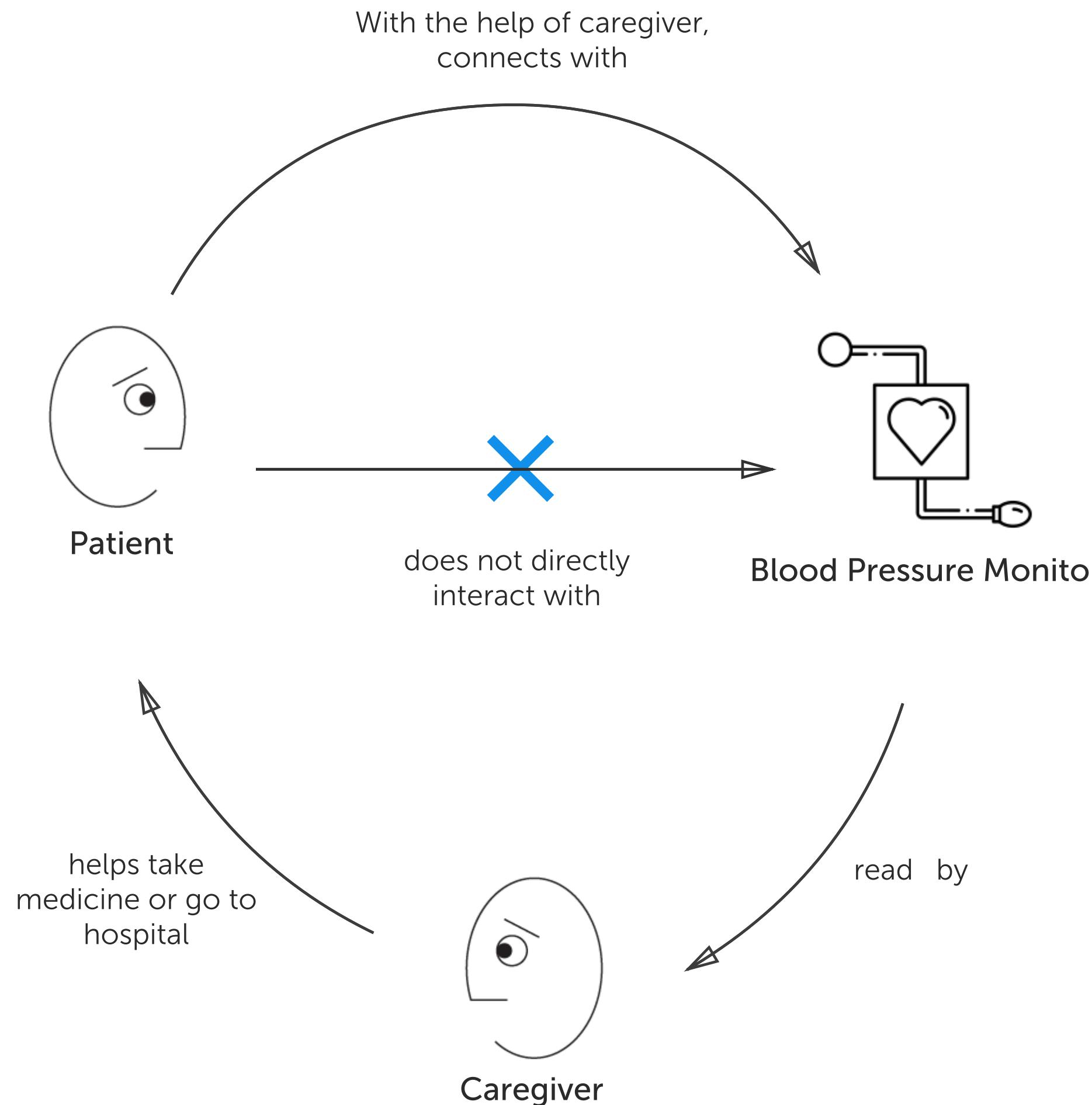
1. Always busy. Can't find time to measure Uttam's BP
2. Physical and emotional burnout for working 24*7
3. She has no way to determine Uttam's BP during sleep
4. Always worried about Uttam's health during work or outside
5. No better way to know about Uttam's health other than calling

IN-HOME

Current Blood Pressure Monitor System



Current Blood Pressure Monitor System



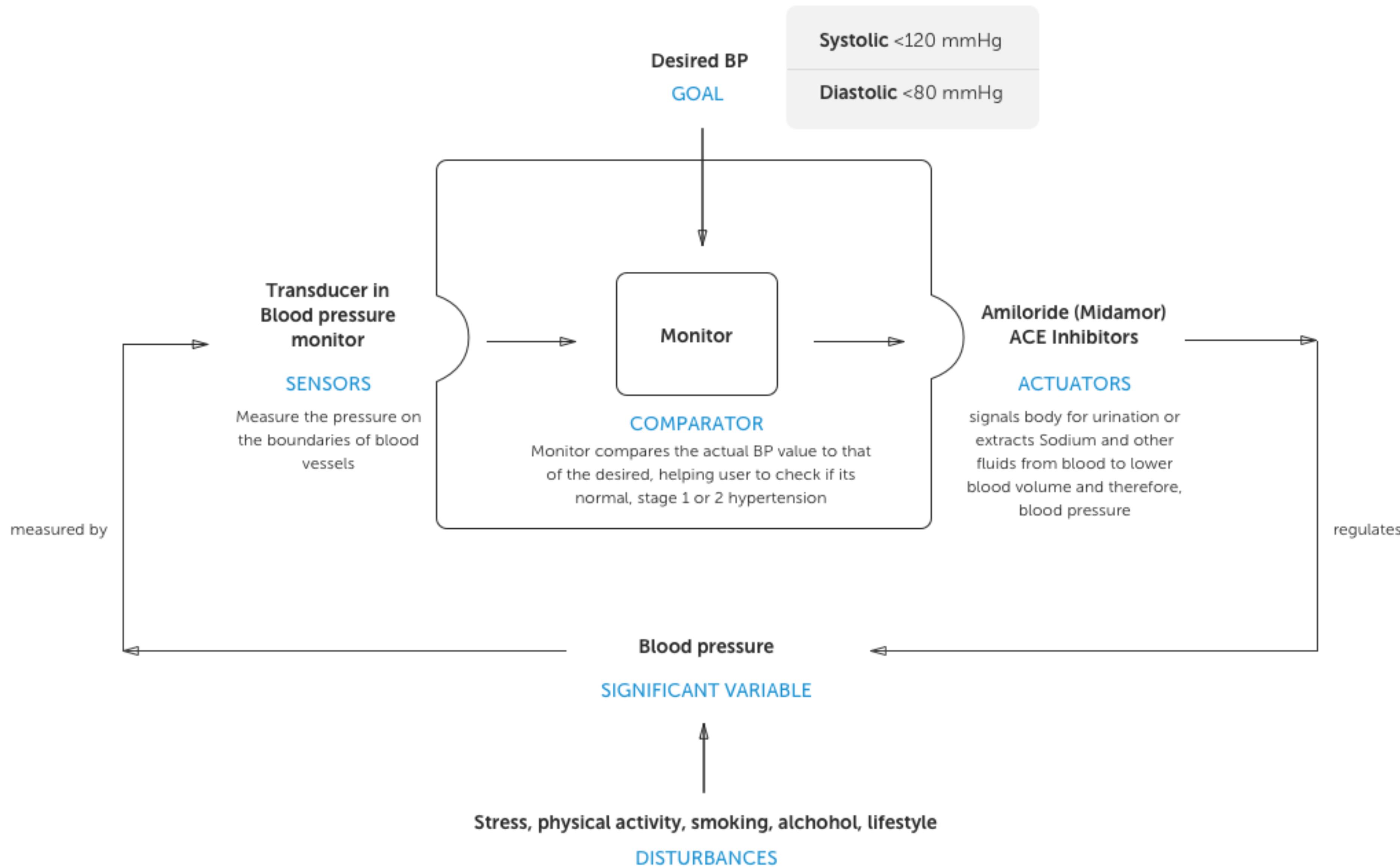
	Systolic (mmHg)	Diastolic (mmHg)
Desired	<120	<80
Stage 1 Hypertension	130-139	80-89
Stage 2 Hypertension	>140	>90
Hypertensive crisis	>180	>120

Inflated cuff
Upper arm Artery
When the cuff is fully inflated to this pressure, no blood flow occurs through the artery.

Reduced pressure in cuff
Systolic pressure forces blood through artery
As the cuff is deflated below the systolic pressure, the reducing pressure exerted on the artery allows blood to flow through it and sets up a detectable vibration in the arterial wall.

Cuff pressure reduced to diastolic pressure
Blood flows normally causing no vibrations
When the cuff pressure falls below the patient's diastolic pressure, blood flows smoothly through the artery in the usual pulses, without any vibration being set up in the wall.

Current Blood Pressure Monitor System



Problems with current monitoring system

1. Reducing Patient cannot operate monitor or read its measurement. Therefore, monitor cannot be operated without caregiver
2. Caregiver is usually not around. She checks BP only once or twice a week. Whereas, it need to be checked twice a day.
3. Nothing should be eaten for at-least 30mins before measuring BP
4. Arm Position needs to be proper
5. Clothes needs to be avoided
6. Repeat the readings for 2-3 times with an interval of 1-2mins



Opportunities



Reducing stress of
caregiver



Giving more sense of power
and control to patient



Simplifying BP
measurement process



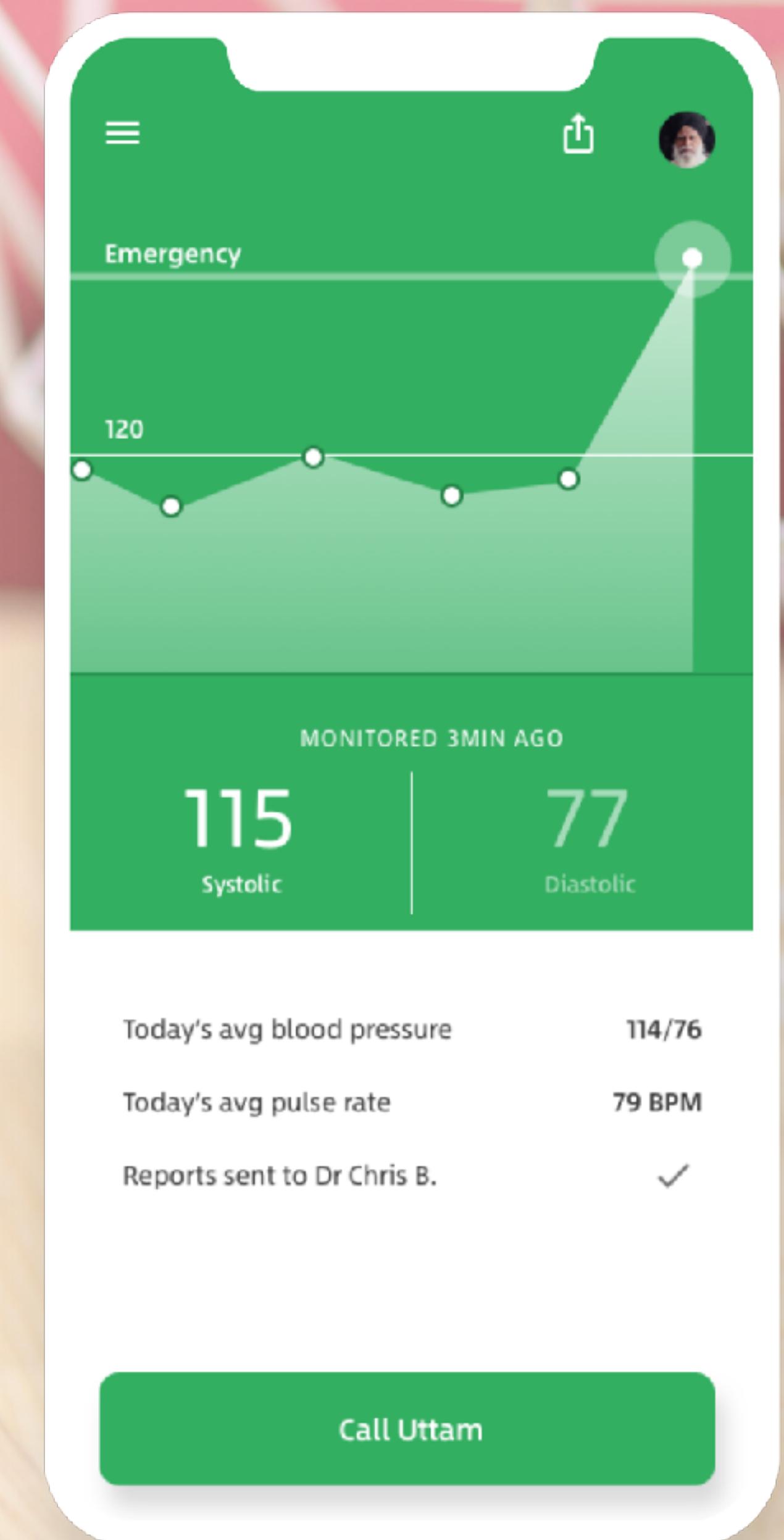
Healthy food intake

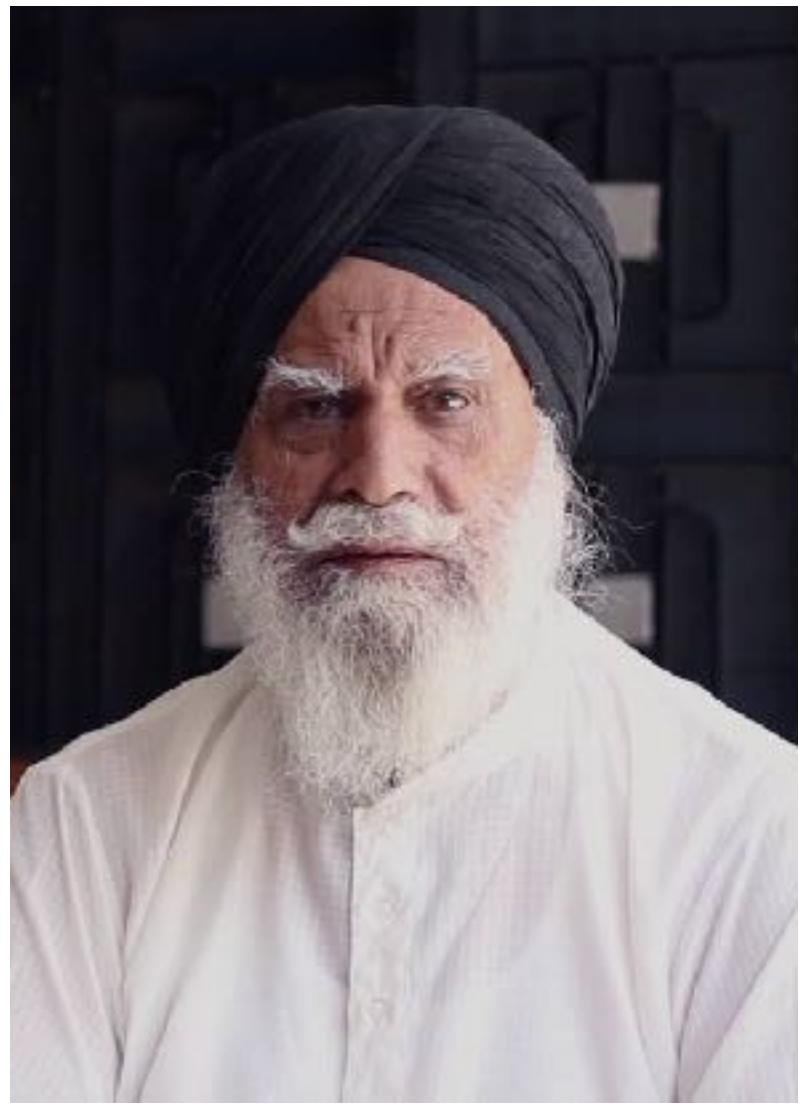
Constraints

1. Uttam cannot read standard BP readings. Therefore, the device for Uttam needs to be as simple as possible
2. Uttam's age and health doesn't allow him to do any extra exercise. Therefore, exercise cannot assist Uttam to reduce his blood pressure
3. It is almost impossible for Uttam to change his day-to-day habits to reduce his stress levels. Therefore, the stress level cannot be affected

Introducing: Hi-low

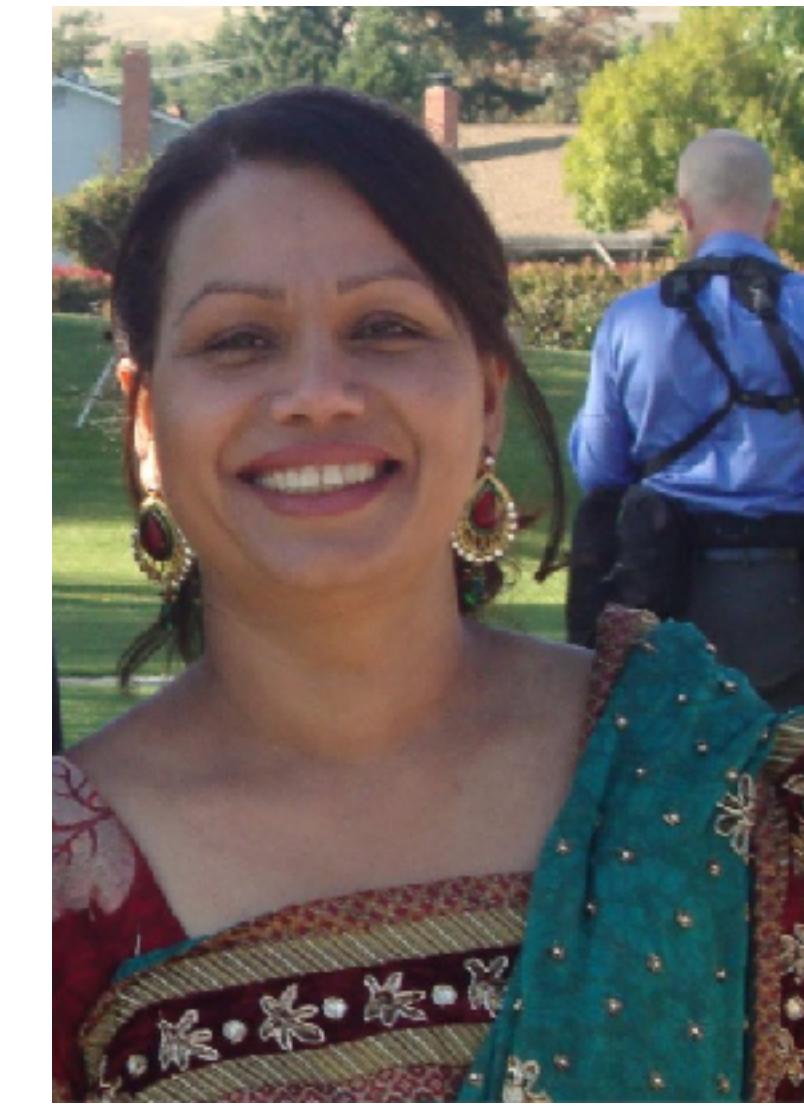
Bracelet + Mobile App





User task — Uttam

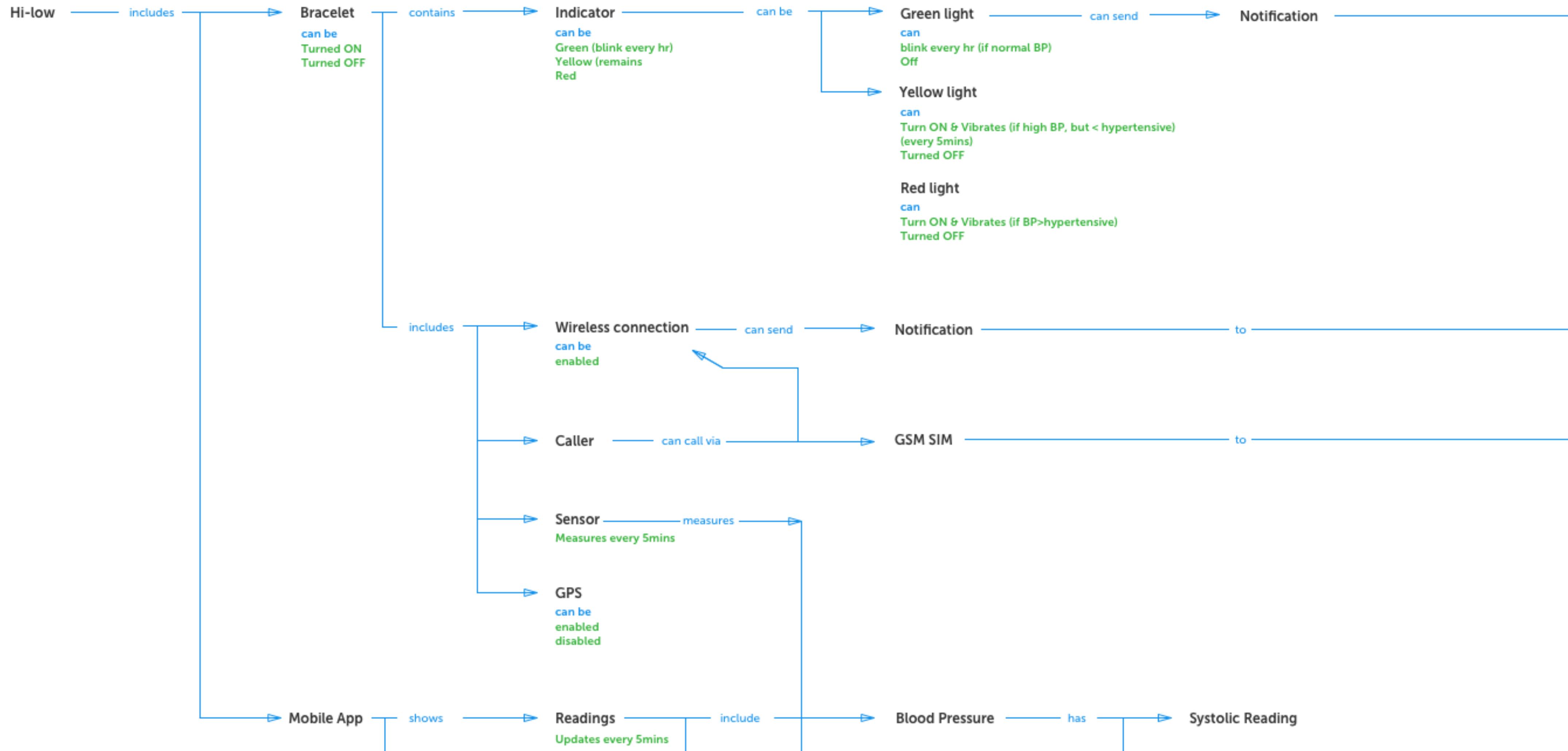
When Kuldeep & I are worried about my health, **I want to** be able to measure the blood pressure myself **so that** I can adjust my sodium intake or take medicine by myself, reducing some of my daughter-in-law's stress

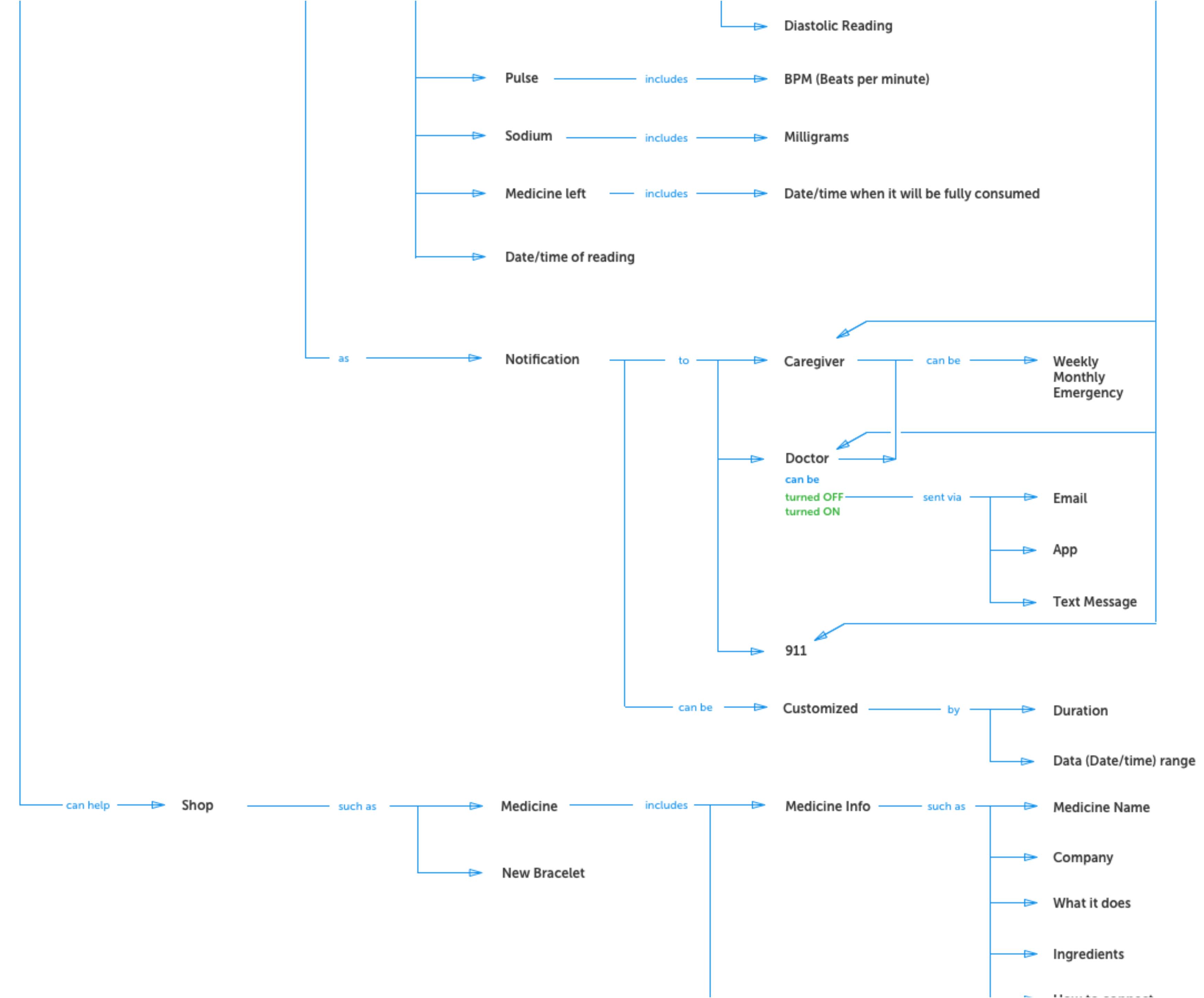


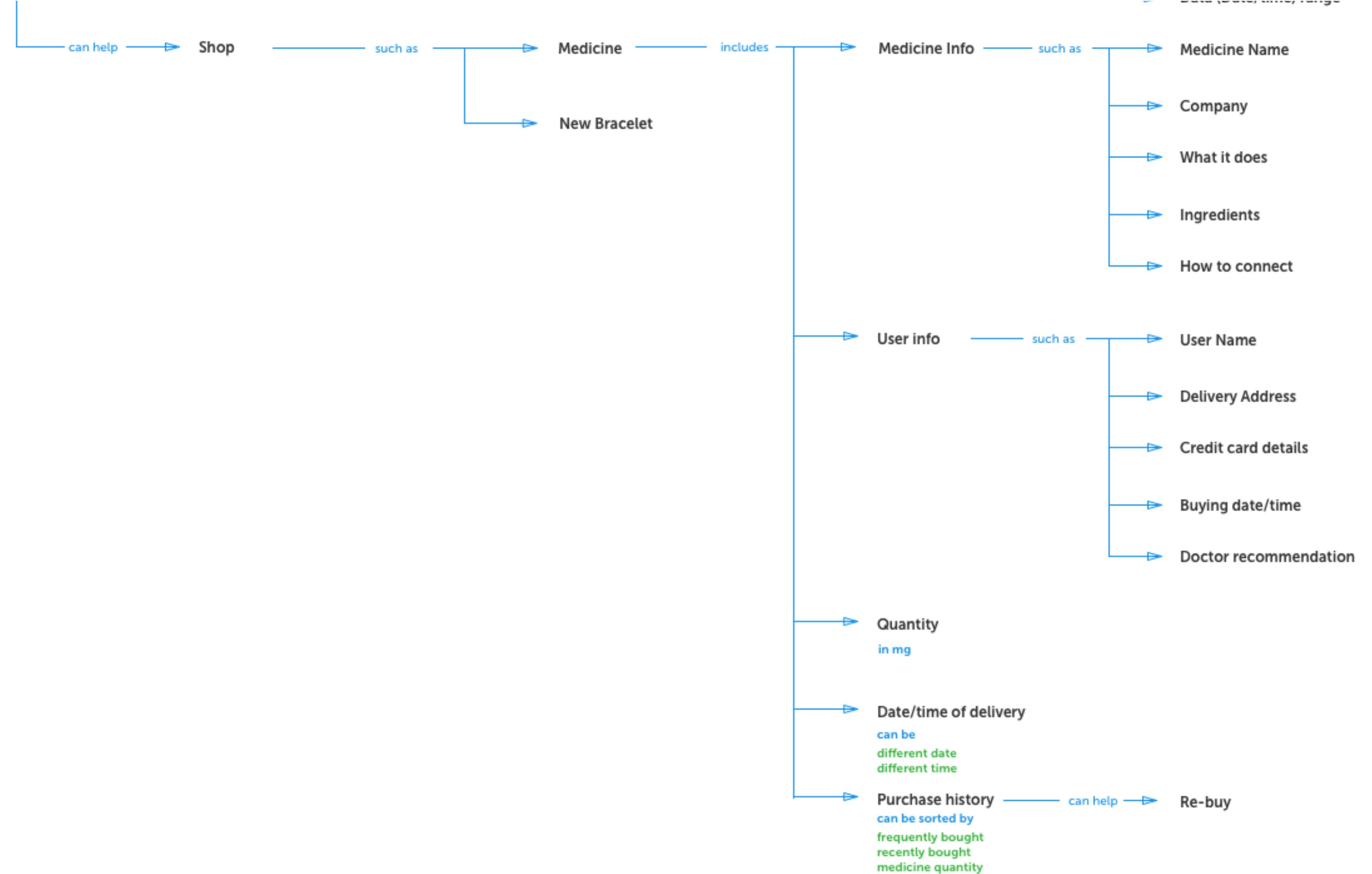
User tasks — Kuldeep

When I am in office and Uttam's blood pressure increases, **I want to** be able to monitor his health remotely **so that** I can contact him to eat healthy, take rest or take medicine so that he feels better soon

Conceptual Model





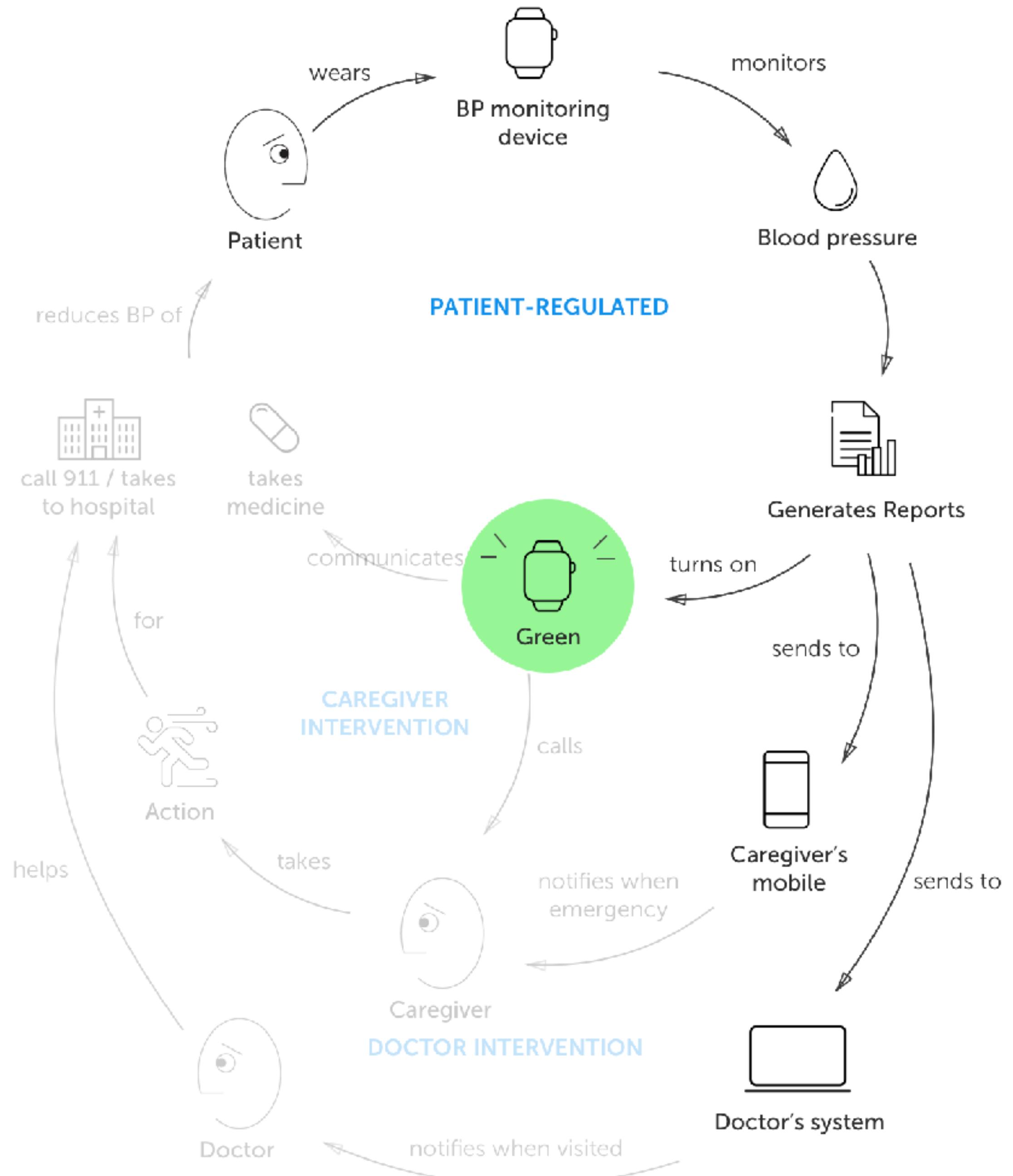


NOTE: Shopping experience is a future concept and hence not translated into the user interface

SCENARIO —1

Normal Blood Pressure

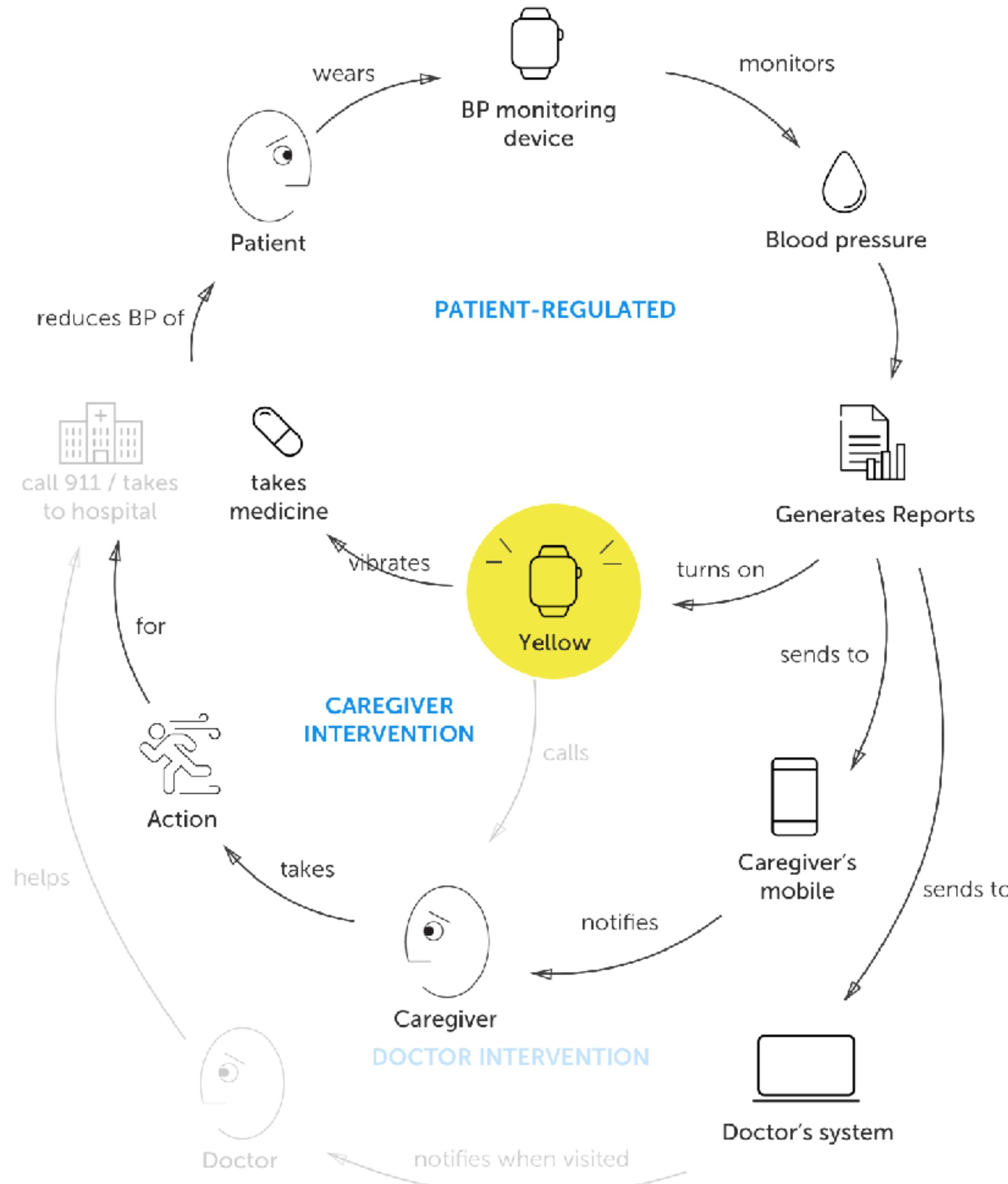
The device monitors Blood pressure every 5mins. And reports the state (green/yellow/red) to patient every 1hr. User can wish to tap on the device to see the current state. If the state is green, BP is normal



SCENARIO —2

Normal < BP < Hypertensive

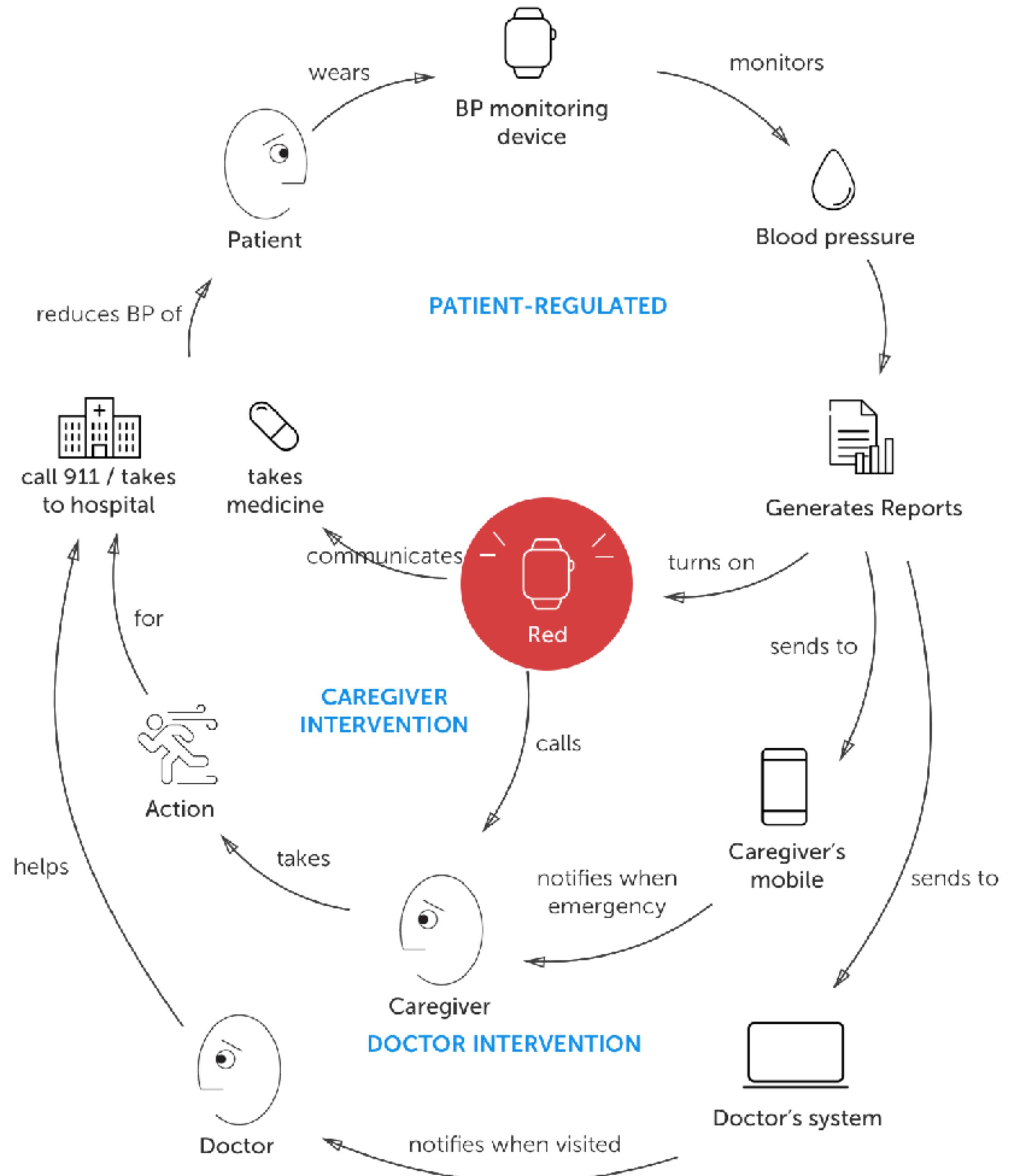
When device displays yellow state, it vibrates to notify patient to take medicine. Medicine relaxes blood vessels and reduces salts in blood to lower the blood pressure to normal. The mobile app notifies the caregiver to connect with the patient for any necessary actions



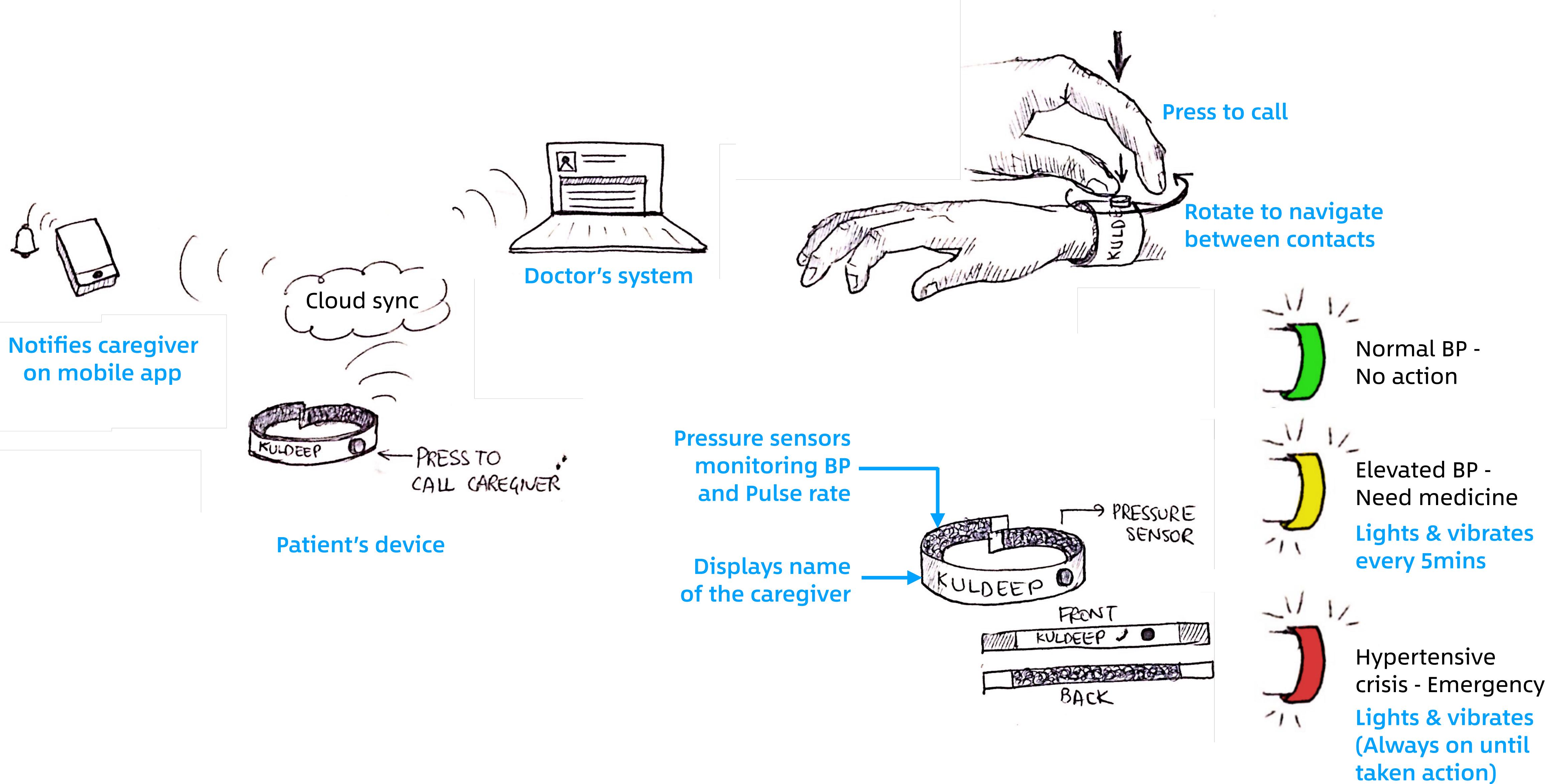
SCENARIO —3

BP > Hypertensive

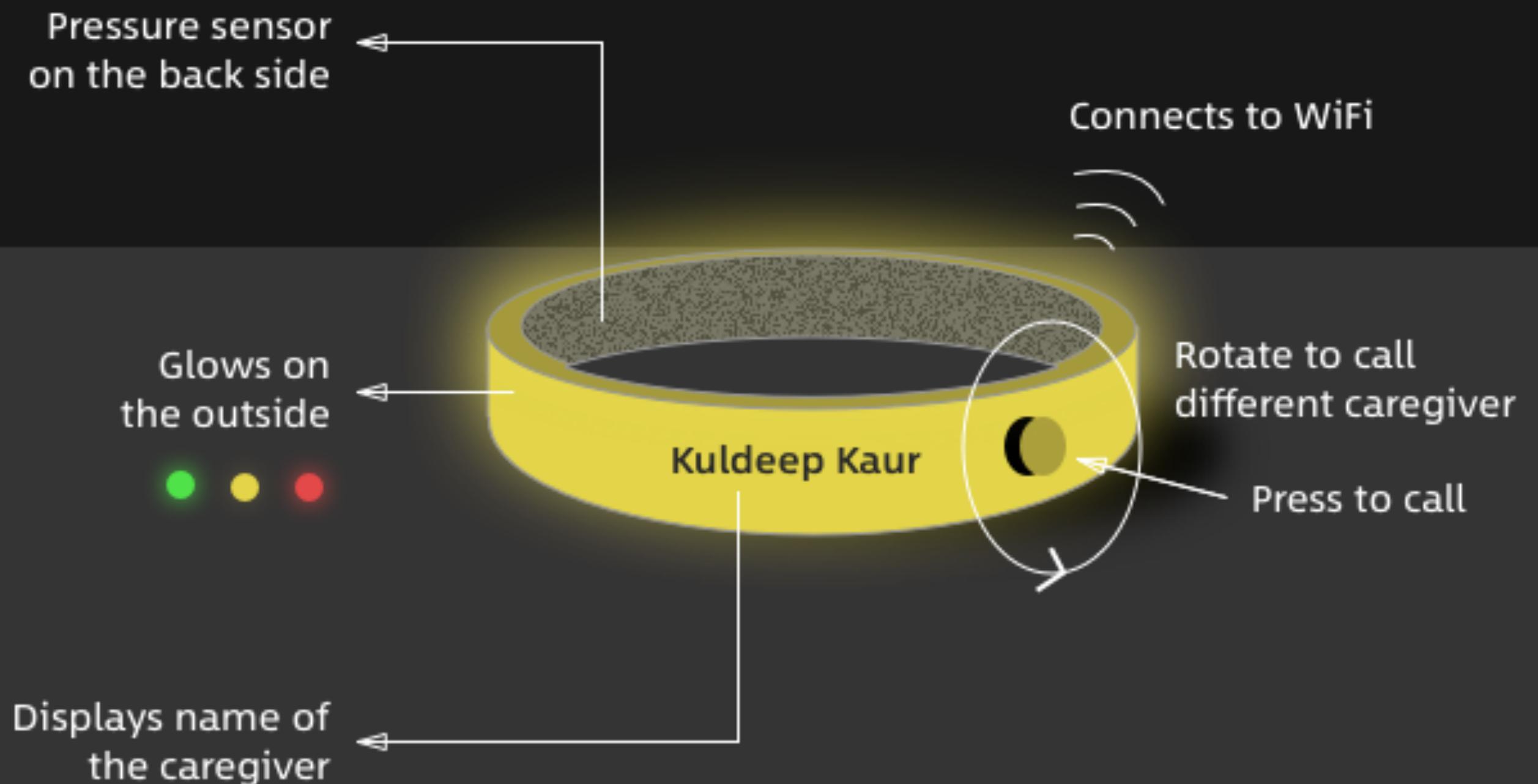
When device shows red color, it means blood pressure is in hypertensive crisis state and patient need immediate attention. Therefore, the device automatically calls 911 and connects patient with the caregiver



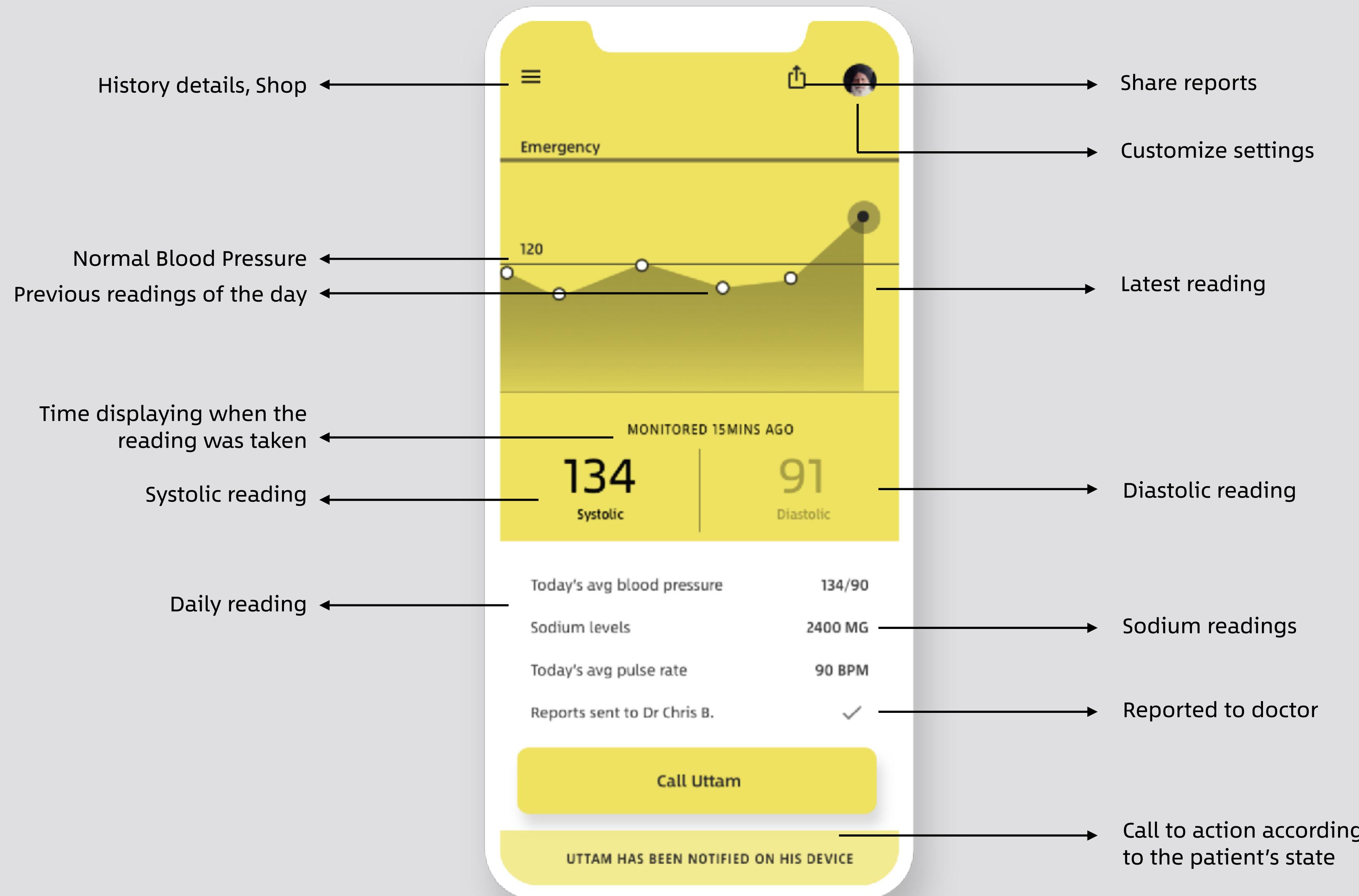
Patient interactions with the device



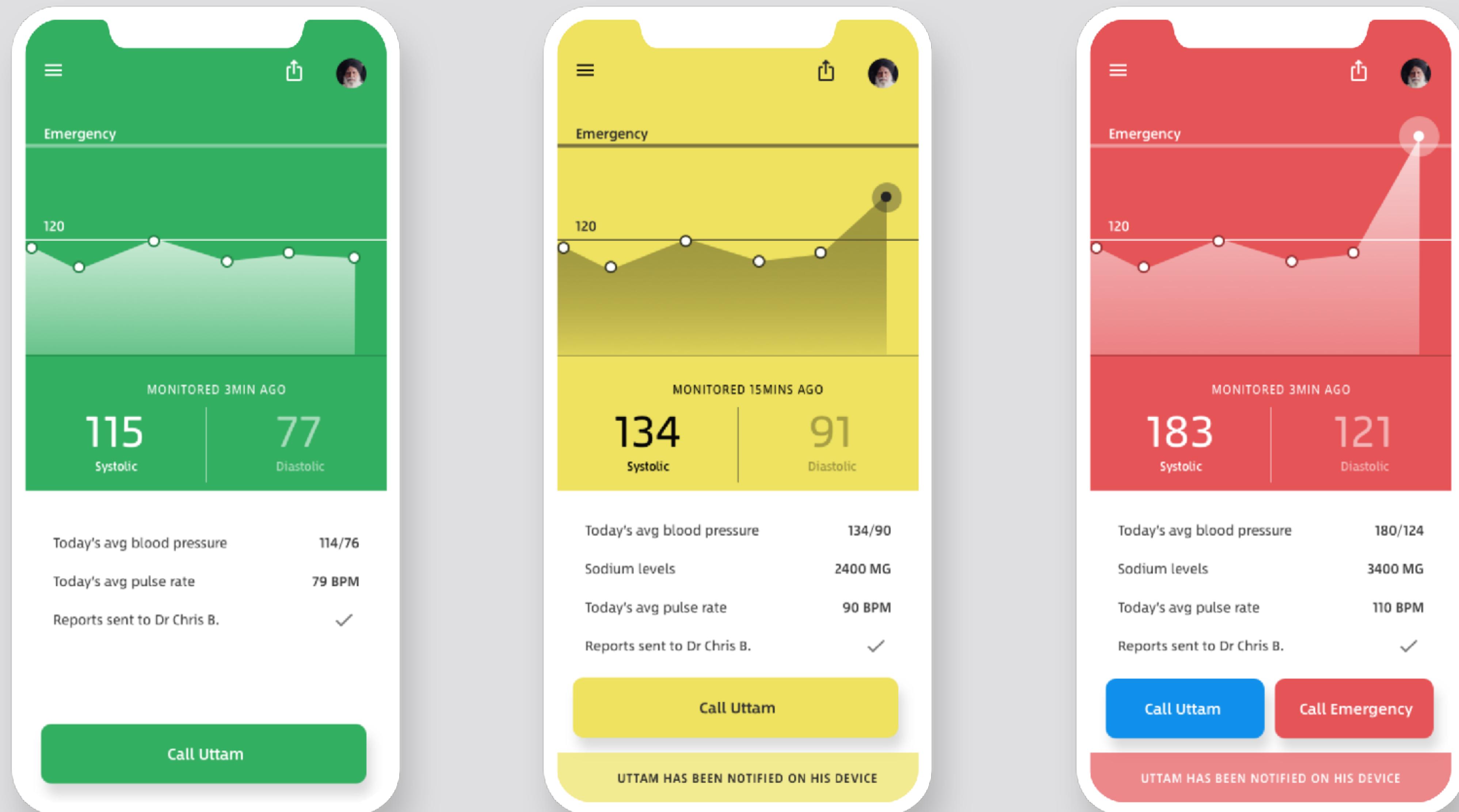
Hi-low Bracelet (for patient)



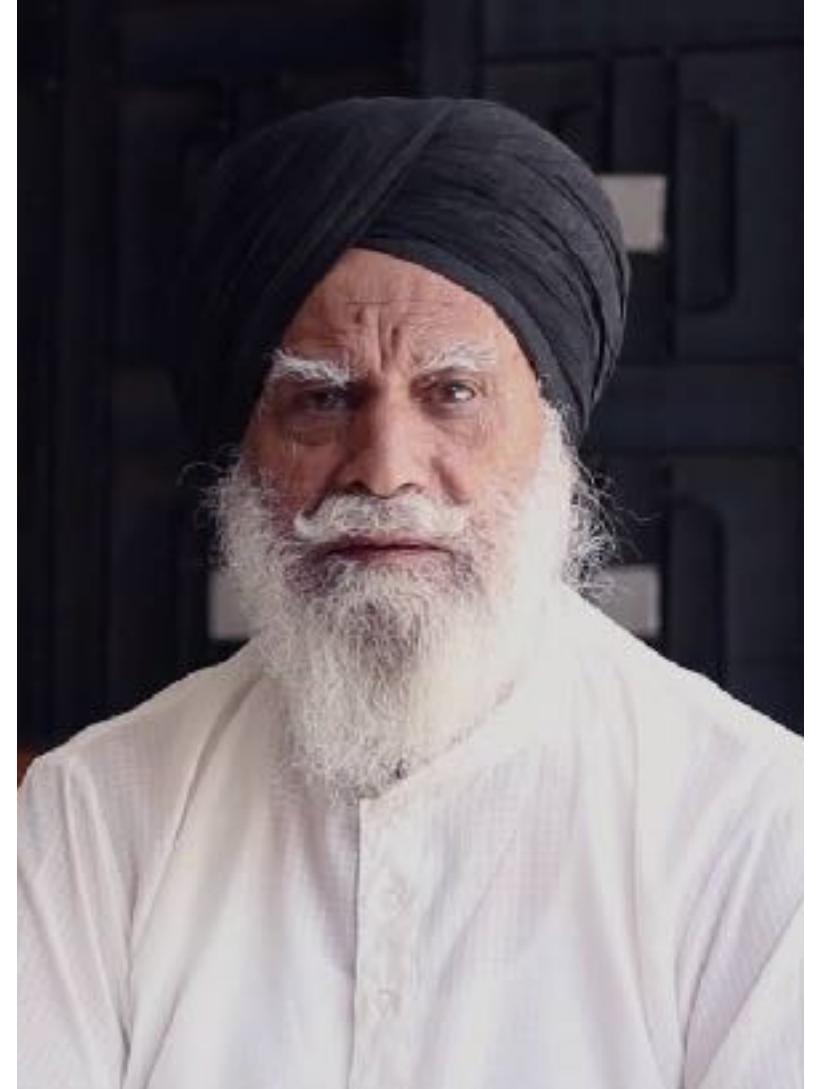
Hi-low Mobile App (for caregiver)



Hi-low (Mobile App)



What this means for Uttam (patient)



1. More control over his own health (especially his diet)
2. Ease of use and simplicity of the bracelet helps him monitor his own health now
3. Reduced visits to doctor for regular check-ups

Uttam Singh

69 yrs old



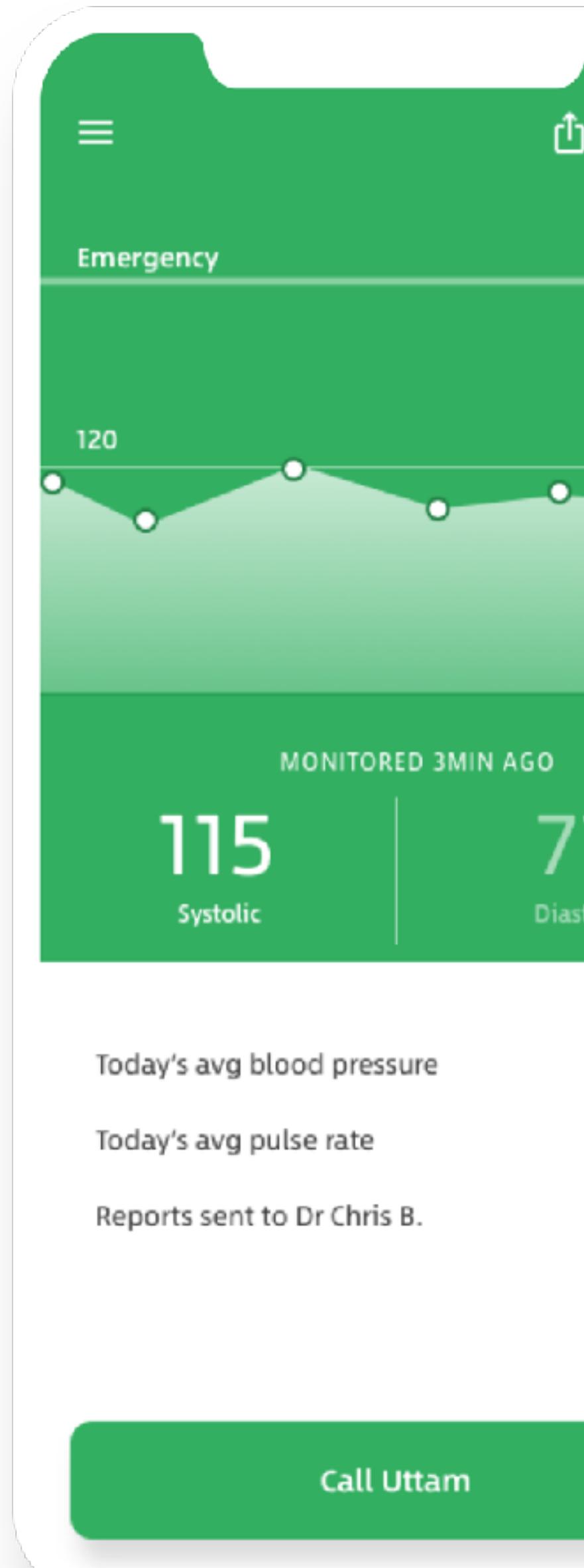
What this means for Kuldeep (caregiver)



Kuldeep Kaur

52 yrs old

1. Lesser day-to-day worry about Uttam
2. Measuring BP goes from weekly-worry to self-monitoring
3. BP readings becomes easily accessible
4. Fewer doctor visits - Lesser hassle
5. More control over Uttam's health with easy access to BP, Sodium levels and Pulse rate
6. Easy to share reports to doctors with one-click



Next Steps

Mobile App

1. Adding Shopping capabilities to buy medicine, bracelet or strap of the bracelet from the mobile app itself
2. Chat functionality for caregiver to talk to doctor directly from the app



Bracelet

1. Introducing GSM SIM capabilities to connect with Caregiver even when the Wifi is down
2. Task (exercise, drinking water etc.) notifications in the bracelet to change patient behavior and prevent hypertension situation.

