

Digitisation Empowers Patients

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My Sharing

- ▶ Electronics and Computer Hobbyist 🤖
- ▶ Interested in Mechatronics and digitisation
- ▶ Patient, devoted to serve patients and medical people
- ▶ We will look at the following gadgets
- ▶ Digital kettle
- ▶ Sphygmomanometer
- ▶ Blood Glucose meter
- ▶ Oximeter
- ▶ Thermometer
- ▶ HA Go

How long does water start bubbling?

- ▶ What is the temperature when water starts bubbling?
- ▶ How long does it take for water to start bubbling?
- ▶ How long does it take for water to start roaring?
- ▶ What is the temperature when water boils?



When and at what ?°C will water bubble?

- ▶ Start heating water at 24°C
- ▶ It takes only 21 seconds to see the bubbles rising from the heating plate



How long does water roar?

- ▶ Water continues to bubble from 35°C onward
- ▶ Small sound of bubbling can be heard



Water roars loudly

- ▶ At 48°C
- ▶ Water continues to bubble, but there are more and bigger bubbles
- ▶ Roaring sound becomes rather heavy



Water boils at what temperature?

- ▶ Water continues to bubble
- ▶ A lot of big bubbles emerge
- ▶ water takes 10 minutes and 27 seconds to reach 100 °C



You now know

- ▶ 1. Water starts bubbling at about 21 sec after being heated at 24 °C
- ▶ 2. The roaring is audible at 48 °C
- ▶ 3. Water roars vigorously at 97 °C
- ▶ 4. Water boils rigorously at 98 °C
- ▶ 5. Power is cut by the controller at 100 °C
- ▶ 6. You have now been empowered to know things about heating water



Before the advent of sphygmomanometer

- ▶ People were not aware of the danger of High Blood Pressure that might cause Cerebrovascular Diseases
- ▶ They might get stroke and might die or paralyse

With Mercury sphygmomanometer

- ▶ With the mercury sphygmomanometer
- ▶ Doctors could listen to the sounds of the falling mercury column to determine the Systolic and Diastolic pressures
- ▶ Patients did not bother much about the pressures because they could not read



Aneroid Sphygmomanometer

- ▶ The Dial type sphygmomanometer is easier to carry around
- ▶ Easier to read than mercury column
- ▶ But the pointer keeps moving quickly
- ▶ Not many patients had the chance to use it



Digital arm blood pressure meter

- ▶ People can measure their blood pressures at home with digital display in numbers.
- ▶ They become aware of the Systolic and Diastolic pressures in numbers
- ▶ At 120-60 mm, BP is good and they are happy
- ▶ At 140-80 mm, they worry about the high pressures
- ▶ At 180-120 mm, they go to consult their doctors immediately
- ▶ Patients are empowered



Continuous monitoring of blood pressure

- ▶ With development of IoT, the values of the pressures can be saved on the app of a watch which can be sent to a website
- ▶ A few smart phone companies are researching on measuring blood pressure with smart phone
- ▶ It will become continuous monitoring of the fluctuation of pressures
- ▶ Patients may know the causes of high blood pressures and may be able to avoid them.



Blood sugar meter (Glucose meter)

Before advent of blood sugar meter

7 symptoms of diabetes:

- 1) Increased thirst & hunger
- 2) Frequent urination
- 3) Fatigue
- 4) Blurred vision
- 5) Slow healing wounds
- 6) Numbness or tingling in the hand or foot
- 7) Unexplained weight loss

When Glucose meter is cheaply available

people with diabetes learn to monitor their blood sugar levels by

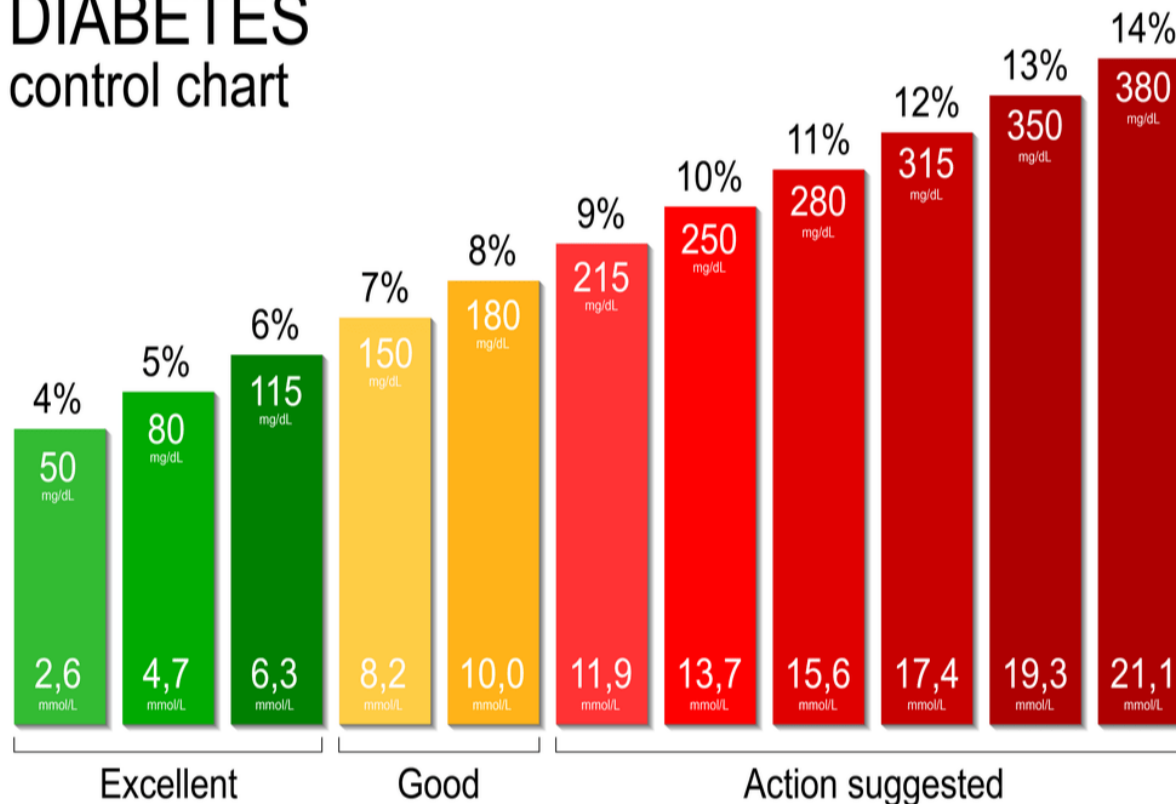
- pricking their finger with a lancet to obtain a small drop of blood
- Placing the blood on a test strip inserted into the meter.
- The meter then measures the amount of glucose in the blood and displays the result on a screen



Readings from Glucose meter

► Normal Fasting Range: 3.9-5.6 mmol/L 70-100 mg/dL

DIABETES
control chart

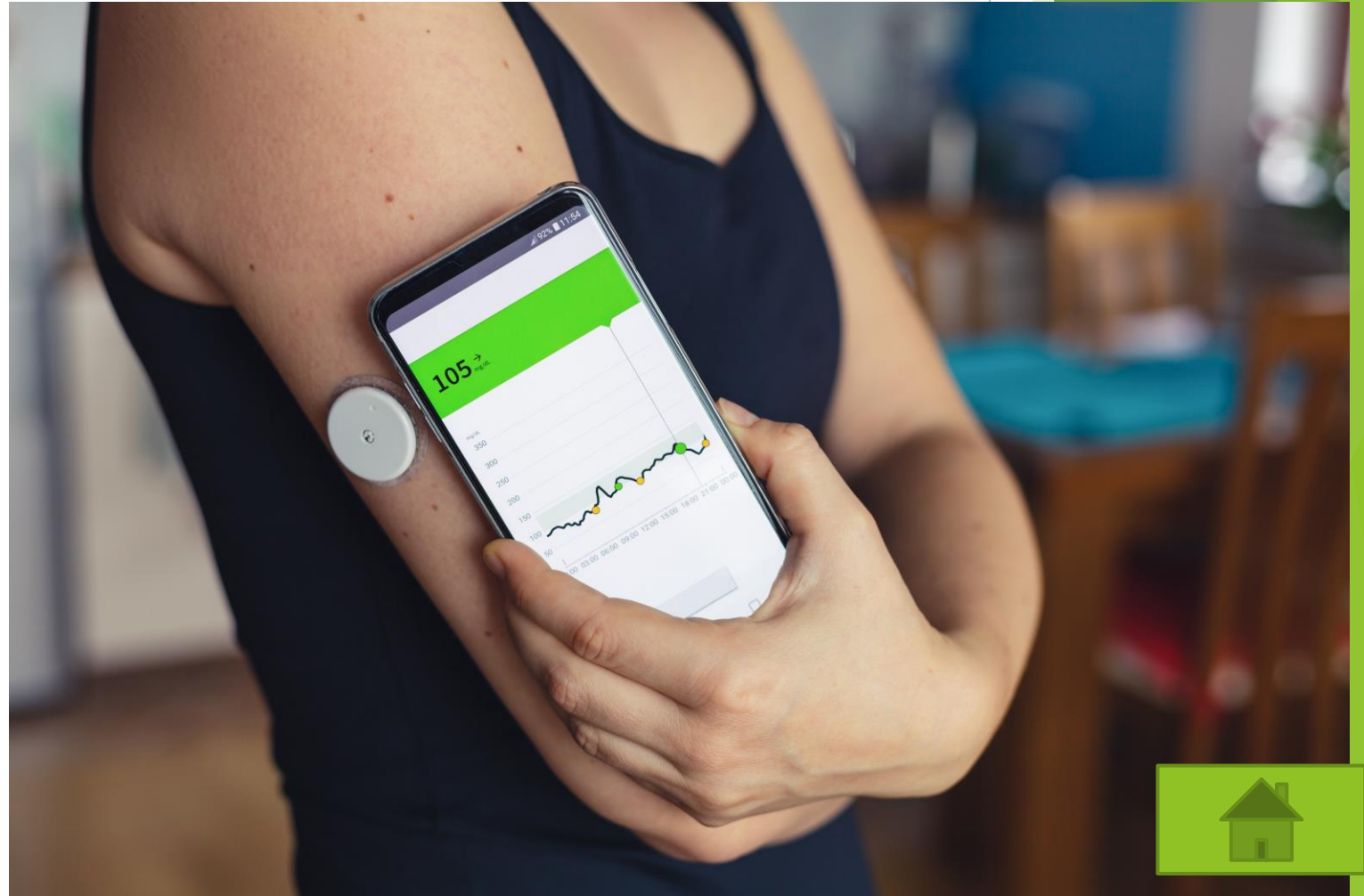


People with diabetes are empowered

- ▶ They know how to prick their finger
- ▶ They know the meaning of the number
- ▶ They can make informed decisions about their diet, exercise, and medication
- ▶ They know when to eat a candy with glucose or inject insulin

Continuous Blood Glucose Monitoring

- Modern technology enables continuous monitoring



Oximeter

- Dr. Ko Wing-man's story
- It is an invasive major operation to measure blood oxygen level
- An Oximeter is now a non-invasive medical device that gives the oxygen saturation level in numbers.



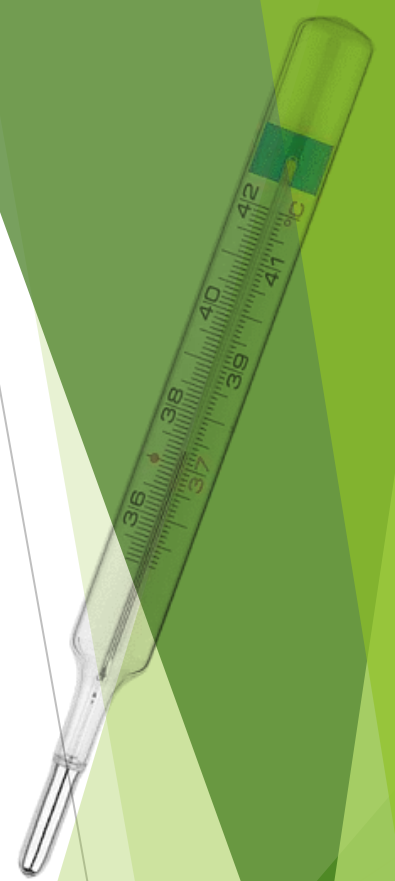
Oximeter

- The normal range of Oximeter: 95% to 100%
- If the Oximeter reading $< 90\%$, potential medical emergency, should seek immediate medical attention.
- It is commonly used by patients with respiratory conditions like Asthma, COPD
- It was use in COVID-19 patients to check breathing
- Patients know how to use it



Traditional ways to check fever

- ▶ When I was young, thermometer was not easily available
- ▶ TCM practitioners and parents use their hands to check the forehead of the patient
- ▶ Later, mercury thermometers were available.
- ▶ The oral one with longer mercury reservoir
- ▶ The anal one with more robust mercury reservoir
- ▶ Reading the mercury thread was rather difficult.
- ▶ They were not easy to use, and not welcomed by babies and parents.



Digital Thermometers

Then came the digital ones



Infrared Thermometers

- ▶ With digital output
- ▶ Easy to use
- ▶ Can store hundreds or thousands of data on the thermometer
- ▶ Can save data to the app of a smart phone



Water-powered thermometer for the shower

- ▶ How hot would you like the water from your shower?
- ▶ With this gadget in your shower, you know the temperature of water you enjoy most.
- ▶ It prevents scorching babies.



Cup with digital reading of Temperature

- ▶ How hot would you prefer your coffee?
- ▶ With digital display, you know your favourable temperature of your coffee



Summary:

- ▶ With **digital kettle**, you are sure the water is boiled and save energy by automatic cutting of electricity
- ▶ **Digital BP meter** empowers patients to know their BP and take proper action
- ▶ **Digital Glucose meter** empowers patients to make informed action
- ▶ **Digital Oximeter** empowers patients to know their blood oxygen level
- ▶ **Digital Thermometer** checks out temperature easily in various situations, and empowers users to make the right choice



HA Go

- ▶ HA Go is a patient portal implemented by HA in 2019
- ▶ It has many apps for patients to make their hospital visit friendly



HA Go - Go

- ▶ However, HA Go did not publish individual's examination results in their own account at first
- ▶ I advocated on the release of these results to the owner since 2019 when I was a member of Patient Advisory Committee.
- ▶ Glad that after pushing for more than 2 years, some of these results are now available on HA Go.
- ▶ This will empower patients, just like the digital meters.

Data shown on HA Go

我的健康

自我管理

我的紀錄

我的資訊

我的紀錄

就診文檔

報告

就診文檔

報告

就診文檔

報告

就診文檔

報告

住院紀錄 (入院日期) ▲

找不到相關紀錄

急症室紀錄 (求診日期) ▲

找不到相關紀錄

門診紀錄 (文檔發出日期) ▲

2023

2023年2月14日

檢驗備忘表

PDF

2023

2023年1月13日

檢驗備忘表

PDF

2022

2022年10月26日

檢驗備忘表

PDF

2022

2022年10月24日

檢驗備忘表

PDF

2022

2022年8月2日

檢驗備忘表

PDF

2022

2022年8月2日

檢驗備忘表

PDF

日期

過去6個月的紀錄 ▼

2023

CBC

瑪麗醫院

2023年2月8日

▼ 顯示報告

Albumin, Albumin Adjusted Ca, Ca, GGT, LFT, Phosphate, RFT

瑪麗醫院

2023年2月8日

▼ 顯示報告

2022

CBC

瑪麗醫院

2022年10月19日

▼ 顯示報告

日期

過去6個月的紀錄 ▼

2023

CBC

瑪麗醫院

2023年2月8日

化驗報告 (參考值)

結果單位

Haemoglobin, Blood (13.3 - 17.1)

13.7 g/dL

WBC (3.89 - 9.93)

4.69 $\times 10^9/L$

Platelet (167 - 396)

131 $\times 10^9/L$

RBC (4.46 - 5.71)

4.69 $\times 10^{12}/L$

▲ 隱藏報告

Albumin, Albumin Adjusted Ca, Ca, GGT, LFT, Phosphate, RFT

Albumin, Albumin Adjusted Ca, Ca, GGT, LFT, Phosphate, RFT

瑪麗醫院

2023年2月8日

化驗報告 (參考值)

結果單位

Sodium (136 - 148)

145 mmol/L

Potassium (3.6 - 5.0)

4.0 mmol/L

Urea (3.0 - 8.8)

9.9 mmol/L

Creatinine (67 - 109)

128 $\mu\text{mol}/L$

eGFR(CKD-EPI) (>90)

46 unit

Protein, Total (68 - 84)

70 g/L

Albumin (39 - 50)

42 g/L

Bilirubin, Total (4 - 23)

12 $\mu\text{mol}/L$

以上所顯示的資料只供參考，並不構成對一般情況的醫療意見或診斷，亦不應取代專業醫學意見、診斷或治療。如有查詢，請於覆診時向醫護人員尋求意見。

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我的健康

我的健康

我的健康

我的健康

How to empower patients to use their data?

- ▶ Releasing exam data in HA Go alone is not very effective
- ▶ Patients have to know the meaning of these results
- ▶ The results should be uploaded in less than a week
- ▶ The results should be complete
- ▶ A few ways to empower the patients

Ways to empower patients

- ▶ 1. Patient Empowerment Forum organizes talks
- ▶ 2. Doctors teach patients at consultation sessions
- ▶ 3. Doctors & Nurses to organize talks for their patients
- ▶ 4. Hospitals to organize talks for their patients
- ▶ 5. Patient organisations invite doctors or pharmacists to deliver talks on meaning of results
- ▶ 6. HA Go publishes meaning of results inside HA Go

After patients know the meaning of results

- ▶ They will check their results after each test
- ▶ They know their current state
- ▶ They will do their best to make the results fit
- ▶ They become better in health
- ▶ They go to hospital less often
- ▶ Doctors & Nurses have lower loads
- ▶ A great save of resources for hospital and HA

Thank you