



# TAKING BLOOD PRESSURE MANUALLY – A VIDEO GUIDE FOR NURSING STUDENTS

Thesis

Cavalieri Monje Alba

Health and welfare program  
Degree program in nursing

2023

Bachelor of Health Care

Nursing (AMK)

---

<b>Tekijä</b>	Alba Cavalieri Monje	<b>Vuosi</b>	2023
<b>Ohjaaja</b>	Anniina Tohmola		
<b>Toimeksiantaja</b>	Lapin AMK: Kirsi Heikkinen		
<b>Työn nimi</b>	Verenpaineen mittaaminen manuaalisesti – Video-opas hoitotyön opiskelijoille		
<b>Sivu- ja liitesivumäärä</b>	17 + 5		

---

Opinnäytetyön tarkoituksena oli tuottaa opetusvideo verenpaineen mittauksesta manuaalisella verenpainemittarilla Lapin ammattikorkeakoulun kansainvälisille sairaanhoitajaopiskelijoille. Opinnäytetyön tavoitteena oli kehittää opiskelijoiden taitoja verenpaineen mittaamiseen manuaalisella verenpainelaitteella ja tulosten analysointiin potilashoidon parantamiseksi.

Opinnäytetyön kuvataan verenkiertoa, verenpainetta, manuaalisia verenpainelaitteita, sähköisten ja manuaalisten verenpainelaitteiden eroja sekä manuaalisen verenpaineen historiaa.

Opinnäytetyövideo toteutettiin toiminnallisena opinnäytetyönä. Se kuvattiin puhelimella ja editointiin CupCut-sovelluksella. Valmis video tallennettiin Lapin AMKin Youtube-kanavalle.

Videon sisältö on lyhyt kuvaus kahdesta manuaalisesta verenpainemittarista ja niiden eroista, selitän manuaalisen- verenpainelaitteen osia, koska niitä käytetään videossa. Videolla kuvataan manuaalinen verenpainemittaus vaihe vaiheelta. Sen lisäksi videolla käsitellään normaaleja verenpaine-arvoja ja ohjeistetaan korkean verenpaineen ohjaukseen.

Avainsanoja: verenpaine, sairaanhoito, ohjausvideo, manuaalinen  
verenpainemittari

Muita tietoja Työhön liittyvä multimediaesitys

Bachelor of Health Care

Nursing (AMK)

---

<b>Author</b>	Alba Cavalieri Monje	<b>Year</b>	2023
<b>Supervisor</b>	Anniina Tohmola		
<b>Commissioned by:</b>	Lapland UAS: Kirsi Heikkinen		
<b>Title of Thesis</b>	Taking blood pressure manually: A video guide for nursing students		
<b>Number of pages</b>	17 + 5		

---

The purpose of the thesis was to take a guiding video of taking the blood pressure with a manual blood pressure machine for the Lapland University of Applied Sciences international nursing students. The goal of the thesis was to develop the students' skills in taking blood pressure with manual blood pressure machine and analyzing the results, with the hope that the quality of patient care might improve.

In the theory portion it is described about the circulation, blood pressure, manual blood pressure machines, differences between electrical and manual blood pressure machines and history of the manual blood pressure.

The thesis video was filmed in my mother's house in Spain. My sister was filming, my mother was the "patient" and I took her blood pressure. I used an app on my phone called CupCut to edit the video, and I posted it on Youtube for the supervisor and commissioner to see and evaluate.

The content of the video is a brief explanation of the two types of manual blood pressure machine and their differences, I explain the parts of the Aneroid blood pressure machine, as that is the one used for the video. I explain step of step of taking the blood pressure. I educate on the normal blood pressure chart on all ages and what to do if the patient has high blood pressure.

Key words           nursing, blood pressure, manual blood pressure machine, video  
                          Guide

Other information  the thesis includes a multimedia presentation

## CONTENTS

1 INTRODUCTION .....	5
2 PURPOSE AND OBJECTIVES .....	6
3 BLOOD PRESSURE .....	7
4 METHOD OF IMPLEMENTATION.....	13
5 ETHICAL CONSIDERATIONS AND RELIABILITY .....	17
6 DISCUSSION.....	18
7 REFERENCES.....	20
8 APPENDIX.....	22

## 1 INTRODUCTION

This thesis project is about the manual blood pressure machine, how to use it properly, the different types and its development through history. A 5-minute video guide has been filmed with the purpose to help new nursing students learn about the manual blood pressure machine, it teaches how to use it properly, what are the normal systole and diastole numbers in different ages and how to educate a patient with high blood pressure.

The aim being to improve student's skills to take blood pressure manually by learning how to use it efficacy by getting trustworthy measurements and projecting my knowledge to new nursing students.

Our heart continuously pumps blood, and our blood vessels are pipes. The blood is pumped from the heart to the veins and distribute it throughout the body. And with a blood pressure gauge we can measure if the heart and veins are working correctly. (Scherer, 2021)

Blood flows through the blood vessels around our body. But the vessels are not passive tubes. Instead, they assist the heart in circulating the blood and influence the blood's constitution. (Ody & Norris, 2017)

The normal levels for a healthy person are usually 120/80. When blood pressure is very elevated it puts extra strain on blood vessels, heart and other organs, such as the brain, kidneys and eyes and if it stays elevated for a long period of time it can increase the risk of several serious and potentially life-threatening health conditions, such as: heart disease, heart attacks, strokes, heart failure, peripheral arterial disease, aortic aneurysms, kidney disease, vascular dementia. (NHS, 2019)

## 2 PURPOSE AND AIM

The purpose of this thesis is to do a video guide on how to take blood pressure with a manual machine for the students at Lapland University of Applied Science.

The aim is to give more information of how to use manual blood pressure machine, how to educate a patient in case they have high blood pressure and how to take a trustworthy measurement which will develop student's skills and the care and safety for the patients might improve.

### 3 BLOOD PRESSURE

#### 3.1 The formation of blood pressure in the body

Our heart continuously pumps blood, and our blood vessels are pipes. The blood is pumped from the heart to the veins and distribute it throughout the body. And with a blood pressure gauge we can measure if the heart and veins are working correctly. (Scherer, 2021)

Almost all the substances that our body need to function correctly are transported in the blood: hormones, oxygen and dioxide carbonic are the gases that we use for breathing, digestion products, all the metabolic wastes, and immune cells. Adults have five litres of blood in their body. (Ody & Norris, 2017)

Blood flows through the blood vessels around our body. But the vessels are not passive tubes. Instead, they assist the heart in circulating the blood and influence the blood's constitution. (Ody & Norris, 2017)

Arteries and arterioles are the vessels that take blood away from the heart and the veins and venules will bring the blood back to the heart. When the arterial vessels spread throughout the body they decrease in size until they end up in the capillaries, which connect the arterial and venous system. (Ody & Norris, 2017)

Capillaries have a lot of important functions, but one of them is blood pressure regulation: there are hormones that regulate blood pressure, so when the blood pressure is too low, they will start to stimulate the precapillary sphincters to tighten, which will make the blood vessel system smaller and that will eventually raise the blood pressure. The opposite thing happens when the blood pressure is high, the hormones stimulate the sphincters to relax, which will make the system

volume increase and that will reduce the pressure. (Ody & Norris, 2017) When the blood travels from the vessels to the arteries and to the veins is called blood flow. When the blood is travelling it uses force and depending on the pressure the blood flow has, it exerts into the vessel walls with more force or less force. The blood travels from area that has higher pressure to regions with lower pressure. (NIH, 2018)

Millimetres of mercury are used to measure blood pressure. When the heart contracts is called Systole and when the heart is relaxed it's called diastole. The diastole pressure is always lower than the systole. When the values are very high the more pressure there is on the walls of the arteries. (Ody & Norris, 2017)

The heart pumps blood continuously, depending on the amount of times that does that a minute affects the blood pressure, the other thing that affects the blood pressure is the peripheral resistance, a measure of the diameter and elasticity of the vessel walls. (Ody & Norris, 2017)

### 3.2 The high blood pressure and its disadvantages

The normal levels for a healthy person are usually 120/80. High blood pressure is treated because it strains the arteries and heart over the years (Pelttari, 2023). Persistent high blood pressure increases the risk of diseases or health conditions that are very dangerous and could lead to our death, such as: heart problems that could lead to heart attacks or failure, strokes, peripheral arterial disease, aortic aneurysms, kidney disease, vascular dementia. (NHS, 2019)

When blood pressure is below 90 mmHg systolic and 60 mmHg diastolic is considered low blood pressure. When a person has low blood pressure is at risk of suffering symptoms as: feeling dizzy or weak, could faint and that would lead to possible fall injury. In cases of a very low blood pressure the oxygen levels in the body could be reduced leading to heart or brain damage. (Mayo clinic, 2022)



Smoking, being obese, use too much salt in the diet, sedentary life, too much use of NSAIDs, use of hormones, stress, genetics, and alcohol drinking are the major cause of high blood pressure. (Pelttari, 2023)

Changes in lifestyle, such as: losing weight (if obese), stop smoking, exercising at least 30 minutes a day, not use so much salt in the diet and not drinking alcohol do not help lower the blood pressure, the use of antihypertensive drugs can help reduce the pressure and the diseases caused by elevated pressure. (Pelttari, 2023)

### 3.3 Nurse-patient guidance of high blood pressure

It is very important to identify, prevent and manage hypertension using evidencebased strategies. This is the reason why nurses play a significant role in the control of high blood pressure. (Katende, 2016)

Educate patients on lifestyle modification and maintaining a healthy weight, promote self-management and self-monitoring of high blood pressure, assess, and address antihypertensive medications, practicing team-based patientcentred care to improve hypertension control. (Commodore-Mensah, 2021)

### 3.4 Types of manual blood pressure machine

Two types of manual blood pressure machines are common: the mercury blood pressure machine uses mercury, you track the height of a column of mercury and it is used a lot for clinical trials and in testing high-risk patients, it is not used a lot in healthcare centres, as the mercury can be dangerous and a risk for workers; and the aneroid blood pressure machine, which relies on a small pressure gauge that indicate the systolic and diastolic numbers as you release the air from the pressure gauge. (Smith, 2020)



Image 1: Mercury blood pressure machine (Sie 2016).



Image 2: Aneroid blood pressure machine (Riester 2023)

Aneroid blood pressure monitors have a cuff and gauge, which will be operated manually. They are the most accurate and are used for testing as well as Mercury blood pressure machines. (Agrawal, 2021) It is a small machine which makes it easy to use and that has made the aneroid model very known and famous, it's the most common way to test a person's vital signs. (Smith, 2020)

### 3.5 Differences between manual and digital manual blood pressure machines

The first difference between digital and manual blood pressure machines is that the manual blood pressure machine requires professional knowledge for testing. Therefore, the digital BP machine is easier and faster to use. (Agrawal, 2021) In

digital BP monitors, you can get your blood pressure tested by placing the cuff around your upper arm, your lower arm, or your finger. Manual blood pressure monitors have a cuff that is inflated by the bulb. The cuff will be inflated by pushing the bulb rapidly, then slowly letting the air go you will start hearing Korotkoff sounds that indicate the systolic number and when the Korotkoff sound cannot be heard anymore will indicate the diastolic number. It needs some practicing to do it correctly. For more accurate results you must place the cuff in the upper arm. (Agrawal, 2021)

As digital blood pressure machines are also accurate and they are easier, faster and more comfortable use, they are more used in emergency, intensive and ward care in hospitals. But manual BP machines are used in old people houses and in other healthcare centres. Aneroid monitors often cost less than digital monitors. They range in price from about 20 to 40 euros. (Bradford, 2022)

### 3.6 Manual blood pressure machine history

In 1881, Samuel Siegfried Karl Ritter von Basch invented the first sphygmomanometer. There was a rubber bulb that they would fill with water so it would restrict blood flow in the artery. Then they would connect the bulb to a mercury column, which would translate the pressure required to completely obscure the pulse into millimetres of mercury. (ADC, 2021)

In 1905, Doctor Nikolai Korotkoff was the person to discover and understand the difference between systolic blood pressure and diastolic blood pressure. He realized that the sounds he could hear with stethoscope while taking the blood pressure indicated the systolic and diastolic numbers. (ADC, 2021)

A lot of advances have happened since then with the manual blood pressure machines. We have the mercurial, aneroid, and digital versions. With time, the changes in the monitors and the knowledge that has been built the machines have become more accurate and reliable, slowly becoming accepted as an important vital sign when diagnosing a patient. (ADC, 2021)

### 3.7 Measuring blood pressure with aneroid monitor

First place the cuff into the patient's upper arm and find where the artery is by placing two fingers into the artery place. When the cuff is placed correctly place the stethoscope there and put the earpieces on. Squeeze the rubber bulb multiple times to inflate the cuff. Slightly loosen the valve on the unit and slowly let some air out of the cuff. It must be done slowly because if you let the air out very fast you will not be able to hear the Korotkoff sounds, and the blood pressure cannot be measured. (Bradford, 2022)

When you hear the Korotkoff sounds check the pressure gauge number, that number is the systolic pressure. Continue to deflate the cuff. When you stop hearing the heartbeat, check the reading on the dial. The number is the diastolic pressure. In case of repeating the measurement, it's recommended to wait at least 3 minutes. (Bradford, 2022)

## 4 METHOD OF IMPLEMENTATION

### 4.1 Planning of a functional thesis

I decided to do a functional thesis, and that means my first goal was to produce something that would educate me in the subject I chose, manual blood pressure machine, and get a result. As I started to write the plan of my thesis, I slowly created the idea of what I wanted my thesis to be like exactly, to get to the conclusion that I wanted to make a video about the manual blood pressure machine for nursing students to learn.

The functional thesis has the functional part and the written part. And after a lot of research and work i got all the information a needed to slowly create the thesis material. (Saastamoinen, Vähä, Ypyä, Alahuhta, & Puutalo 2018).

The commissioner of this thesis is senior lecturer Kirsi Heikkinen from Lapland UAS, who has guided and given advice during the thesis process.

My first plan when I thought about doing this thesis 1 year ago was to use school material (manual and electrical blood pressure machine) to be used in the video, but I live in another city and I do not know where to get a manual blood pressure to film this video from, so I decided to buy it and do the video on a family member.

During the planning, i had to find all the information I could by doing research. I decided I wanted to go deep into understanding what blood pressure is and explaining the whole process from circulation to how the manual blood pressure machine works and what kinds there are.

The planning process includes what information to write, in what order, planning the video script, the people appearing in the video and the people filming it, the materials, video editing and where to film.

After the most reliable information was found I would consider as well the advice of the thesis supervisor and coordinator. By applying their recommendations and advice I could get the best of me to find better information and best ways to write it down.

#### 4.2 Video result

The video lasts 5 minutes and 13 seconds. I used that app CapCut to edit the video. I, myself, took the blood pressure from the “patient” in the video, my mother is “the patient” and my sister was filming some of the clips of the video, other parts I filmed myself with a tripod and other parts are pictures with a voice over. The manual blood pressure machine and the stethoscope cost me around 30 euros.

I decided I did not want to use the original audio from the clips, and to make a voice over to explain everything a clearer way. So, the whole video is with a voice over.

The video starts with the title: Video guide on how to take blood pressure with a manual blood pressure machine for nursing students. I explain the different kind of manual blood pressures. I used the aneroid blood pressure for the video, I told the name of the different parts.

I explained how we can identify the systolic and diastolic blood pressure number, the Korotkoff sounds: which are the sound we hear with the Stethoscope that indicate the systolic number when we can start hearing them, and when we stop hearing them it indicates the diastolic number.

I explained how we should let the patient sit for 10 minutes before taking the blood pressure, and then we can start: we place the cuff in the patient’s arm, we find the pulse from the wrist and then from the elbow, we place the stethoscope on top of the artery from the elbow. We find the pulse from the wrist again and we

can start filling the cuff with air until we cannot feel the pulse from the wrist anymore, then we add three more puffs of air. We slowly release the air off the cuff and we wait until we hear the Korotkoff sounds, we know then the systolic number, when we do not hear the Korotkoff sounds we know the diastolic number.

**BLOOD PRESSURE CHART**




	Age	Min	Normal	Max
	1 to 12 months	75 / 50	90 / 60	100 / 75
	1 to 5 years	80 / 55	95 / 65	110 / 79
	6 to 13 years	90 / 60	105 / 70	115 / 80
	14 to 19 years	105 / 73	117 / 77	120 / 81
	20 to 24 years	108 / 75	120 / 79	132 / 83
	25 to 29 years	109 / 76	121 / 80	133 / 84
	30 to 34 years	110 / 77	122 / 81	134 / 85
	35 to 39 years	111 / 78	123 / 82	135 / 86
	40 to 44 years	112 / 79	125 / 83	137 / 87
	45 to 49 years	115 / 80	127 / 84	139 / 88
	50 to 54 years	116 / 81	129 / 85	142 / 89
	55 to 59 years	118 / 82	131 / 86	144 / 90
	60 to 64 years	121 / 83	134 / 87	147 / 91

Image 3: Blood pressure chart (Szilveszter, 2023)

There is a chart with the minimum, normal and maximum blood pressure numbers for all ages, from 1 to 64 years old. The “patient” in the video had 135 systolic and 80 diastolic. The patient is 59 years old, and this blood pressure is considered normal.

After that, I explain how important is to guide a patient if their blood pressure is high. By asking them to monitor their blood pressure every morning for a couple of weeks, and if it is constantly high to book an appointment with the doctor to see if there is need for treatment with medication and lifestyle change.

Explaining what can happen if a high blood pressure is left untreated, it can lead to heart diseases or strokes. As well as, telling them that there are natural ways we can lower our blood pressure, changing our lifestyle, like avoid drinking, not or stop smoking, losing weight, in case of overweight or obese patients, lower the amount of salt used in the diet and exercising 30 minutes every day.

I used my own aneroid blood pressure machine that I bought. And I did the video in my mother's house, as she had to participate in the video. To film I used my own phone.

## 5 ETHICAL CONSIDERATIONS AND RELIABILITY

When doing a thesis, we need to have knowledge of the ethical consideration, which are a collection of principles and values, by following them we make sure that no-one acts in such a way that can be harmful to society or an individual. By doing this we avoid people or organizations from indulging in vicious conduct. They play an essential role during research. (Bhasin, 2020)

To have a neutral, fair, and objective thesis we need to abstain of conflicts of interests. The research done must be ethical and believable, done according to the Responsible conduct of research method. (Finnish National Board on Research Integrity TENK, 2021)

We must consider different things while doing research: The validity of the research, using reliably sources of information. The research method used for the research, there must be a good method to get reliable results. In my case I will use reliable resources, such as web sides provided from Lapland UAS resources and known web sites that have reliable information, that can be checked from the references.

Consent of participants: in my case I am doing the thesis alone, but for filming the video needed a participant to appear on my video as a patient, and of course, before I filmed, I got her consent. Confidentiality: when needing information from other people when using interviews and questioners they should be anonymous unless the person that you are interviewing gives you consent of sharing that information. Accessibility to only relevant information: as I commented before, I



will use reliable resources for the research of my thesis. Integrity and transparency: the thesis needs to be complete with all the information necessary and clear information.

## 6 DISCUSSION

### 6.1 Meaning and Importance of the thesis

A manual blood pressure machine can be used without batteries, in a hypothetical case of war or another situation where batteries are not useful anymore, we will not be able to use digital blood pressure machines anymore. Having the knowledge on how to use the manual machine and identifying the results is very important as a nurse.

Learning can be easier for some students if they see what teachers are explaining, by having a video guide on how to use the manual blood pressure machine can help some students understand it better.

### 6.2 Outcome

When writing the thesis, I realized how complex it is, it was my first time doing a thesis project and it is a lot of time, effort, hard work and research. I learned how to find good information in a subject I am interested on, organize myself, ethical considerations, how to write the best possible way, how to film a video and edit it.

I have learned about anatomy and physiology with researching about circulation, heart and blood pressure, history about the manual blood pressure machine, the different kind there are.

It has felt frustrating sometimes if things did not go as I had planned, but I also learned that the best things come from when you push yourself farther and challenge yourself.

### 6.3 Suggestions for development

After doing all the research and the guide video I have so much more knowledge that can hopefully be used to teach new students in a future. The more knowledge we have as nurses the better care we can give to our patients and the safer it is.

I suggest that we can introduce more teaching through research and video guides during our studies, because when you are actively watching, reading or writing about something it stays in your mind much easier and faster than just listening.

## 7 REFERENCES

ADC. 2021. American diagnostic corporation. History of the Sphygmomanometer. Accessed: 9th October 2021.

<https://www.adctoday.com/learningcenter/aboutsphygmomanometers/history/sphygmomanometer> Agrawal, R. 2021. Digital vs Manual Blood Pressure Monitor. BMW. Accessed:

9th October 2021.

<https://bestweighingscales.in/digital-vs-manual-blood-pressure-monitor/>

Aneroid manual blood pressure machine, from Blood pressure machine.

Accessed: 10<sup>th</sup> February 2023

<https://bloodpressuremachine.co/whatdoesasphygmomanometer-measure/>

Bhasin, H. 2020. What are Ethical

Considerations in Research? Marketing91. Accessed: 9th October 2021.  
<https://www.marketing91.com/ethicalconsiderations/>

Bradford, K. 2022. Blood pressure monitoring at home. Accessed: 19<sup>th</sup> November 2023.  
<https://familydoctor.org/blood-pressure-monitoringathome/#:~:text=The%20aneroid%20monitor%20manually%20checks,cost%20less%20than%20digital%20monitors.>

Blood pressure chart. 2019. Accessed: 30<sup>th</sup> October 2023.  
<https://viphealthandlaser.com/what-is-a-normal-blood-pressure/>

Commodore-Mensah, Y. 2021. The Path to Reversing Worsening Hypertension Control in the US. Accessed: 19<sup>th</sup> November 2023.  
<https://pcna.net/the-path-to-reversing-worsening-hypertension-control-in-the-us/>

Finnish National Board on Research Integrity TENK. 2012. Responsible conduct of research and procedures for handling allegations of misconduct in Finland. Accessed: 19<sup>th</sup> November 2022.  
[https://tenk.fi/sites/default/files/202303/HTKohje\\_2023.pdf](https://tenk.fi/sites/default/files/202303/HTKohje_2023.pdf)

HAMK. 24. 03. 2023. Final thesis. Accessed: 13<sup>th</sup> May 2023.  
<https://www.hamk.fi/planning-studies/final-thesis/?lang=en>

Katende, G. 2016. Nurse-led care interventions for high blood pressure control. Accessed: 19<sup>th</sup> November 2023.  
<https://www.sciencedirect.com/science/article/pii/S2214139116300038>

Mayo clinic stuff. 2022. Low blood pressure. Accessed: 16<sup>th</sup> February 2023.  
<https://www.mayoclinic.org/diseases-conditions/lowbloodpressure/symptomscauses/syc-20355465>

Mercury manual blood pressure machine, from Taking vital signs, 2015. Accessed: 10<sup>th</sup> February 2023.  
[https://brooksidepress.org/vitalsigns/wpcontent/uploads/2015/04/MD0531\\_img\\_25-279x300.jpg](https://brooksidepress.org/vitalsigns/wpcontent/uploads/2015/04/MD0531_img_25-279x300.jpg)

NHS. 2019. High blood pressure. Accessed: 16<sup>th</sup> February 2023.  
<https://www.nhs.uk/conditions/high-blood-pressure-hypertension/>

NIH. 2018. National cancer institute. SEER training modules. Physiology of Circulation. Accessed: 12<sup>th</sup> December 2021.

- <https://training.seer.cancer.gov/anatomy/cardiovascular/blood/physiology.html>  
 Pelttari, H. 2023. High blood pressure. Duodecim. Terveyskirjasto. Accessed: 19<sup>th</sup> November 2023. <https://www.terveyskirjasto.fi/dlk00034>
- Ody, E & Norris, M. 2017. Anatomy and physiology for dummies. 3rd edition. Accessed: 16<sup>th</sup> February 2023. Saastamoinen, M., Vähä, T., Ypyä, J., Alahuhta, M., Puutalo, K. 2018. Toiminnallisen opinnäytetyön oppimiskokemukset. Accessed: 30<sup>th</sup> October 2023. <http://www.oamk.fi/epooki/2018/toiminnallinenopinnaytetyo/>
- Scherer, E. 2021. How Does a Blood Pressure Gauge Work? Howstuffworks. Accessed: 7<sup>th</sup> October 2021. <https://science.howstuffworks.com/innovation/everydayinnovations/question146.htm>
- Shiel Jr, W. 2021. Is A Manual Blood Pressure More Accurate? MedicineNet. Accessed: 7<sup>th</sup> October 2021. [https://www.medicinenet.com/is\\_a\\_manual\\_blood\\_pressure\\_more\\_accurate/article.htm](https://www.medicinenet.com/is_a_manual_blood_pressure_more_accurate/article.htm)
- Sie, L. 2016. Quora. Accessed: 20<sup>th</sup> November 2022 <https://qph.cf2.quoracdn.net/mainimg1faddcdf5e64e2caa57bfdc8f43743bc.webp>
- Smith, E. 2020. This Old Tech: Why Manual Blood Pressure Monitors Still Play a Role in Healthcare. HealthTech. Accessed: 7<sup>th</sup> October 2021. <https://healthtechmagazine.net/article/2020/05/old-tech-whymanualbloodpressure-monitors-still-play-role-healthcare>
- Szilveszter, Z. 2023. Blood pressure chart. Accessed: 19<sup>th</sup> November 2023. <https://www.dreamstime.com/stock-illustration-blood-pressure-chart-young-people-to-old-people-image70979616>
- Riester, R. 2023. exacta® Aneroid Sphygmomanometer. Accessed: 19<sup>th</sup> November 2023. <https://riester.de/products/blood-pressuremanagement/exactaaneroidsphygmomanometer>

## 8 APPENDIX

Video link: <https://youtu.be/a7IPZ5cT3Ag>