



SAHS & NDOH Hypertension Management Lecture Series

Back to Basics in Hypertension Management



Hypertension: Epidemiology, Diagnosis, Targets, Measuring Devices

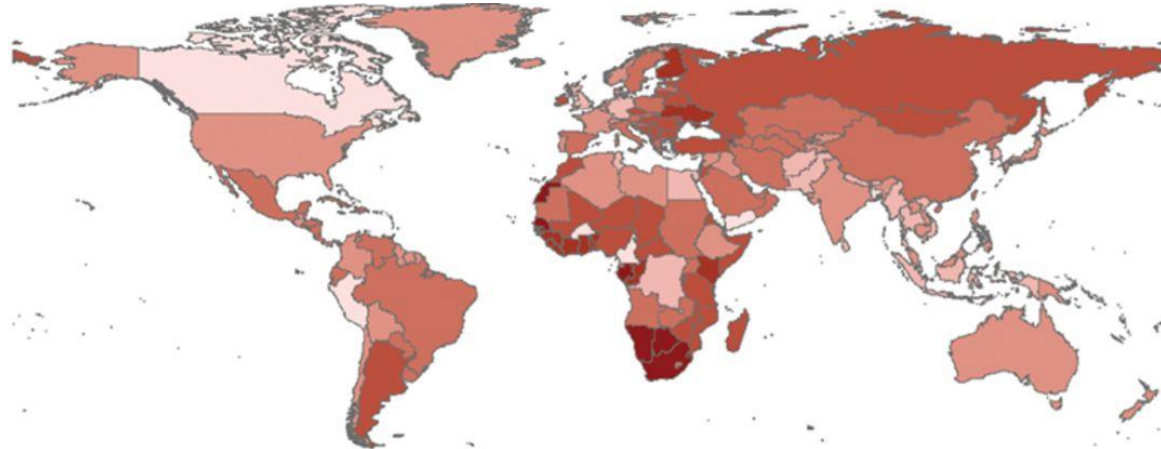
SAHS/DOH
2020



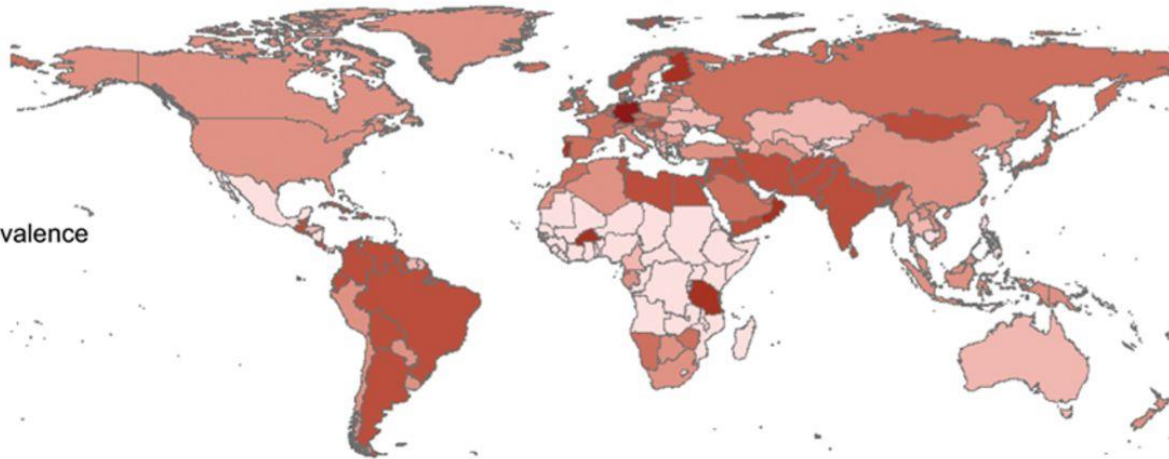
Prepared by Dr R Moodley

Global Prevalence of Hypertension

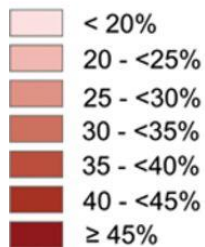
2010



2000



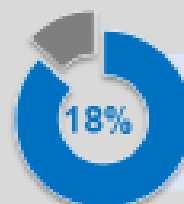
Hypertension Prevalence



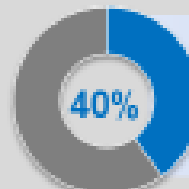
Why talk about the Same Old Thing^{1,2}

67%

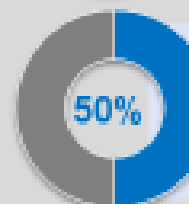
INCREASE
IN HYPERTENSION
Between 1990 and 2010



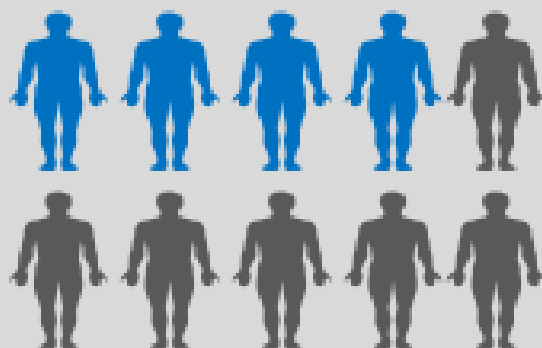
18% of deaths overall are caused by high BP



40% of deaths in people with diabetes is caused by high BP



50% of heart disease, stroke and HF is caused by high BP



4 in 10

**PEOPLE GLOBALLY
HAVE HYPERTENSION**

#1 Risk for Death in 2010

Estimated to causes

500,000
DEATHS

AND
10 MILLION
YEARS OF LIFE LOST



Prevalence of HPT in South Africa

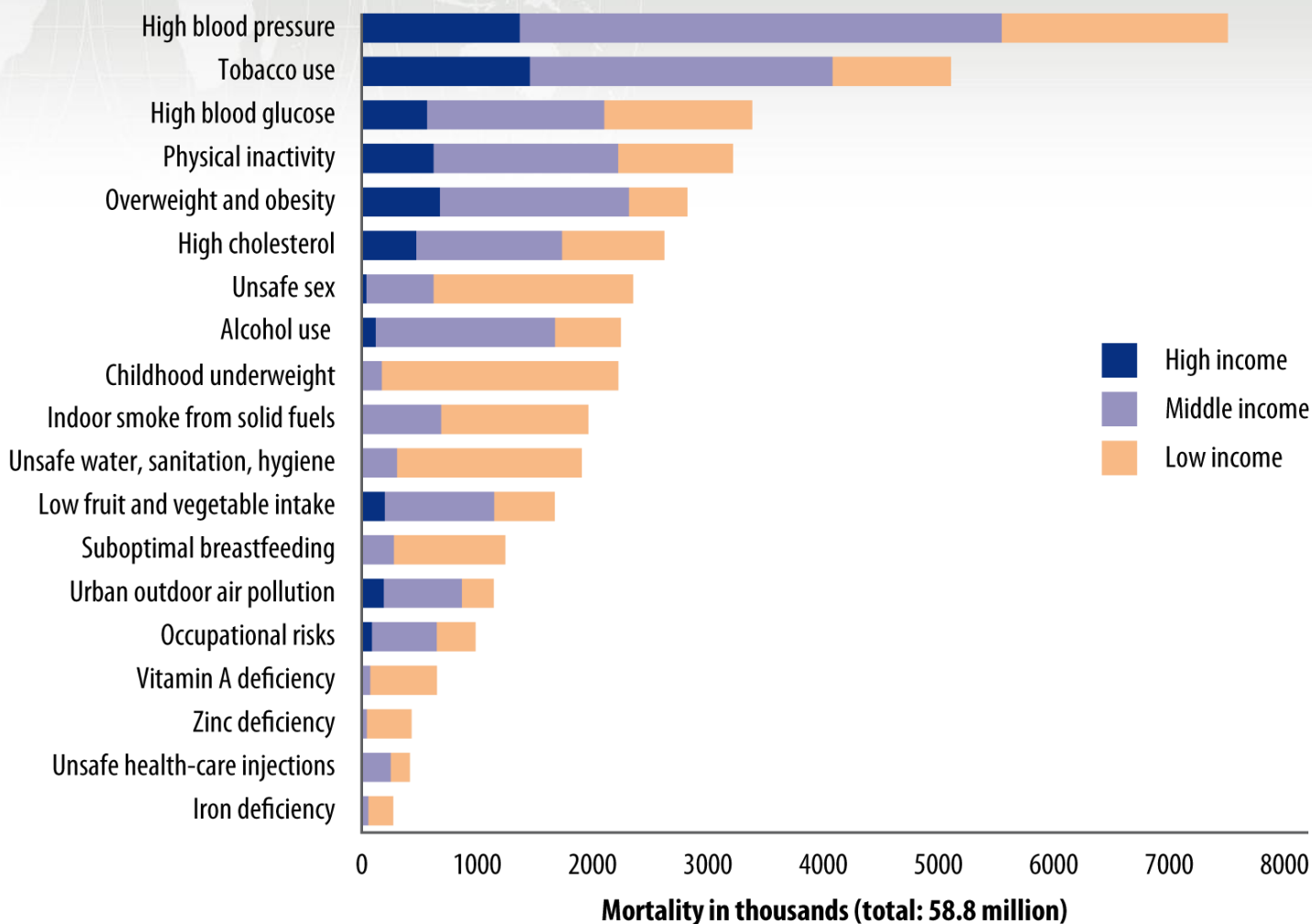
Study	No of participants	Female %	Age	Overall Prevalence
¹ Steyn K. 2001	10 457	58	> 15	14.7
¹ Basu S. 2013	4 223	53	42	49.8
¹ Maseko MJ. 2011	1 029	66	44	46.2
² Peltzer. 2013	3 840	57	>50	77.4

¹Altaklte F et al. Hypertension. February 2015

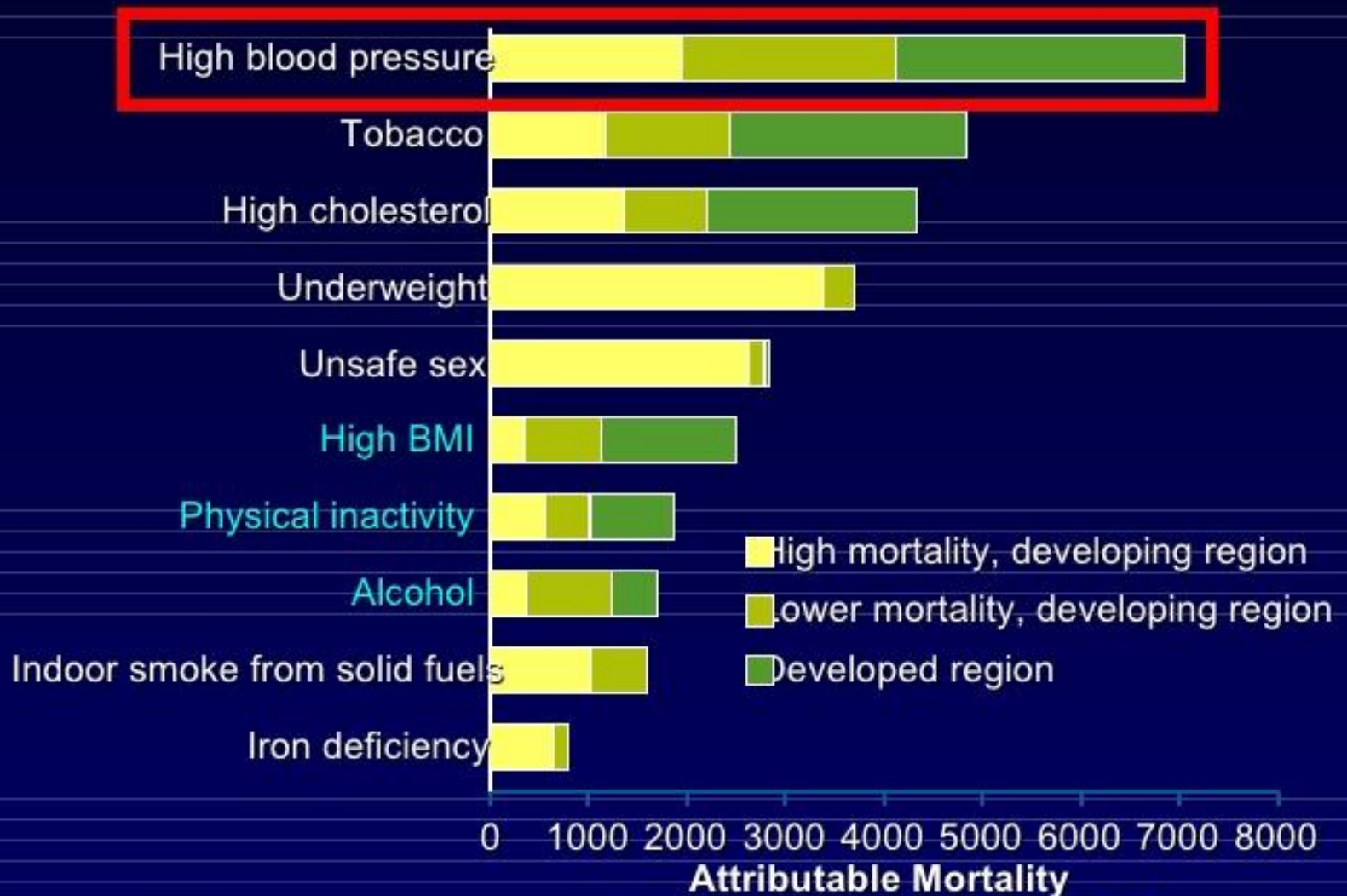
²Peltzer K et al. Cardiovasc J Afr. 2013; 24(3):66–71



Deaths attributed to 19 leading factors, by country income level, 2004

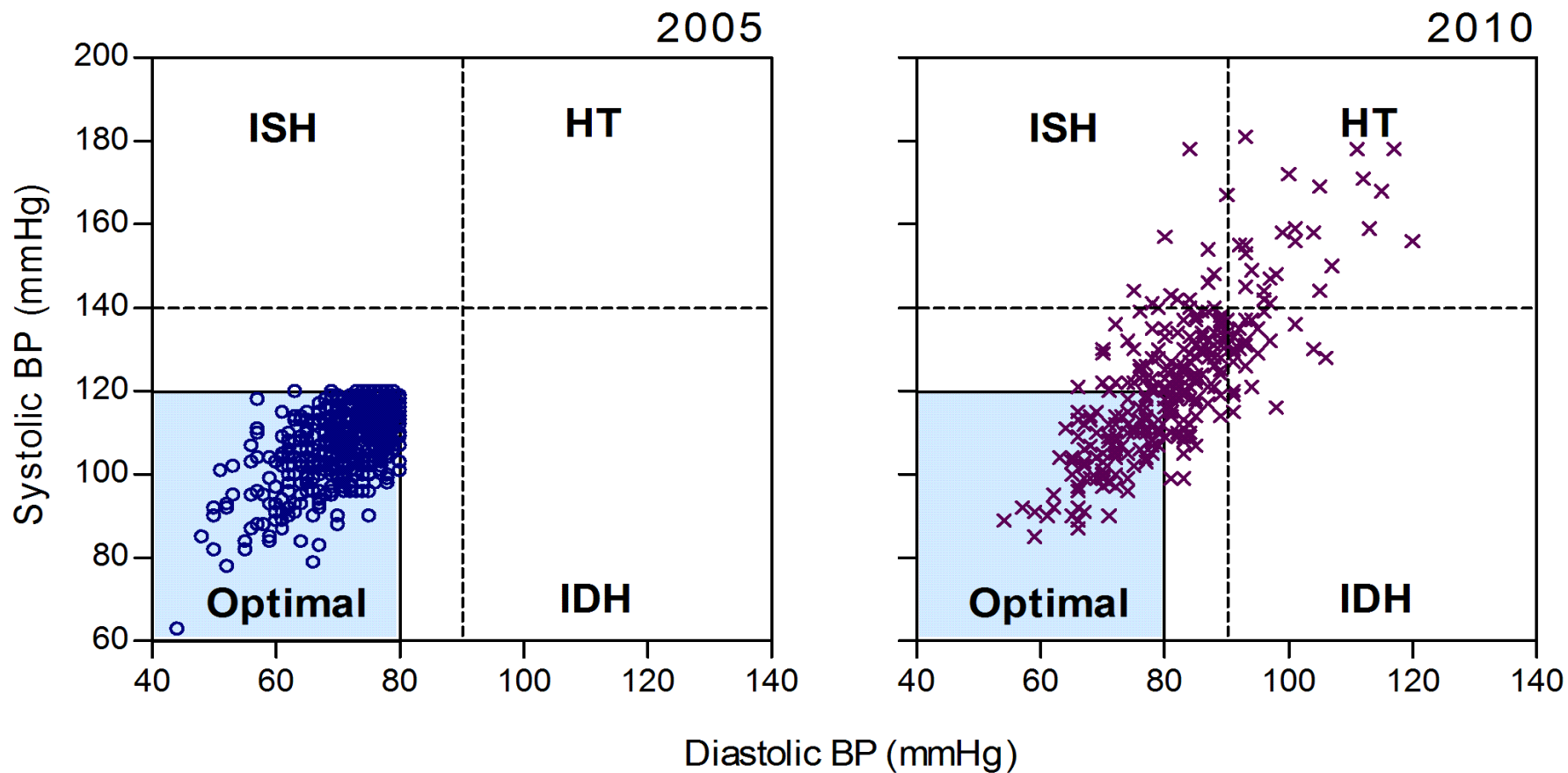


Global Mortality 2000: Impact of Hypertension and Other Health Risk Factors



Ezzati et al. *Lancet*. 2002;360:1347-1360. (In thousands; total 55,861,000)

Optimal BP at baseline, and 5 years later on right graph: P U R E Study

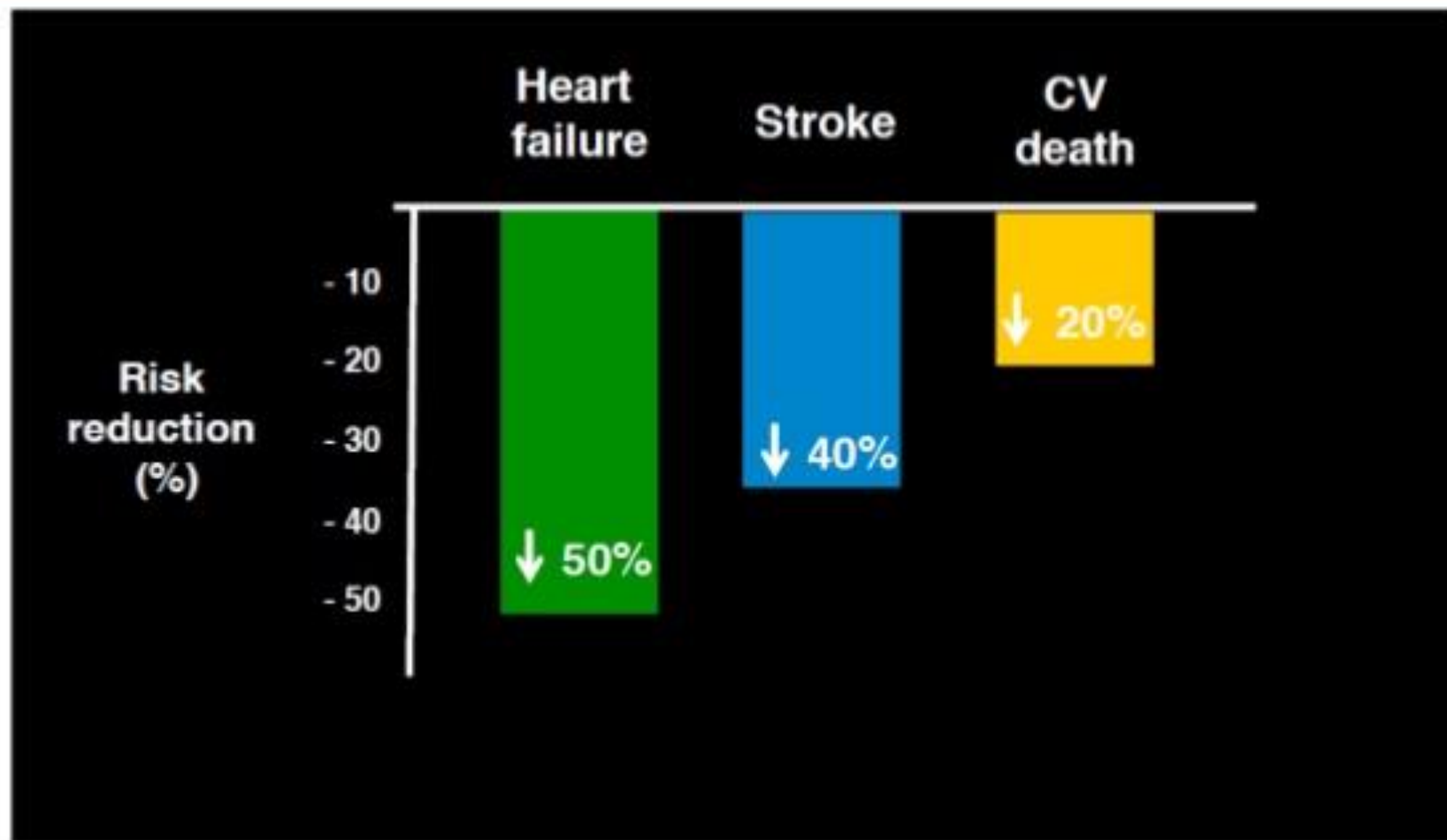


South Africa: Salt Intake

- Over 75% of salt intake is in prepacked foods
- Reducing bread, soup, gravy and margarine intake will decrease intake by 0.85g/day
- Will lessen deaths by 7000/year
- Will lessen strokes by 4000/year



CV benefits of treating HTN



Screening

- Hypertension is predominantly asymptomatic condition
- >50% patients unaware at the time of detection
- Best detected by structured population screening programmes or opportunistic measurement of BP
- BP must be recorded in medical record and be aware of

Screening

Recommendations	Class ^a	Level ^b
Screening programmes for hypertension are recommended. All adults (18 years or older) should have their office BP measured and recorded in their medical file, and be aware of their BP. ^{12,98}	I	B

Classification of hypertension

Recommendation	Class ^a	Level ^b
It is recommended that BP be classified as optimal, normal, high-normal, or grades 1–3 hypertension, according to office BP.	I	C

Classification of Office Blood Pressure

Category	Systolic (mmHg)		Diastolic (mmHg)
Optimal	<120	and	<80
Normal	120–129	and/or	80–84
High normal	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	160–179	and/or	100–109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension ^b	≥140	and	<90

Definition of HPT by Method of BP Measurement

	<i>Office</i>	<i>Auto- mated office</i>	<i>Self</i>	<i>Ambulatory</i>
Predicts outcome	+	++	++	+++
Initial diagnosis	Yes	Yes	Yes	Yes
Cut-off BP (mmHg)	140/90	Mean 135/85	135/85	Mean day 135/85 Mean night 120/70
Evaluation of treatment	Yes	Yes	Yes	Limited, but valuable
Assess diurnal variation	No	No	No	Yes

WHY SO MUCH ATTENTION TO ACCURATE BP MEASUREMENT?

BP ~ 'KING' OF PROGNOSTIC MARKERS

ESSENTIAL FOR DIAGNOSIS

ESSENTIAL FOR BP CONTROL

METHODS FOR THE DIAGNOSIS OF HYPERTENSION

Hypertension can be diagnosed using one of the following three acceptable measurement strategies:

- ▶ Office-based blood pressure measurements
- ▶ Home blood pressure monitoring
- ▶ Ambulatory blood pressure monitoring (ABPM)

Measurement of Blood Pressure

Correct measurement and interpretation of the blood pressure (BP) is essential in the diagnosis and management of hypertension.

- ▶ It is essential that BP machines are properly calibrated,
- ▶ appropriate cuff sizes are selected, and,
- ▶ when BP is measured in an office-based setting
 - ▶ personnel are properly trained and
 - ▶ the patient is positioned correctly.

It is recommended that office BP should be measured in both arms at least at the first visit because a between-arm SBP difference of >15 mmHg is suggestive of atheromatous disease and is associated with an increased CV risk.⁴⁵

I

A

If a between-arm difference in BP is recorded, then it is recommended that all subsequent BP readings use the arm with the higher BP reading.

I

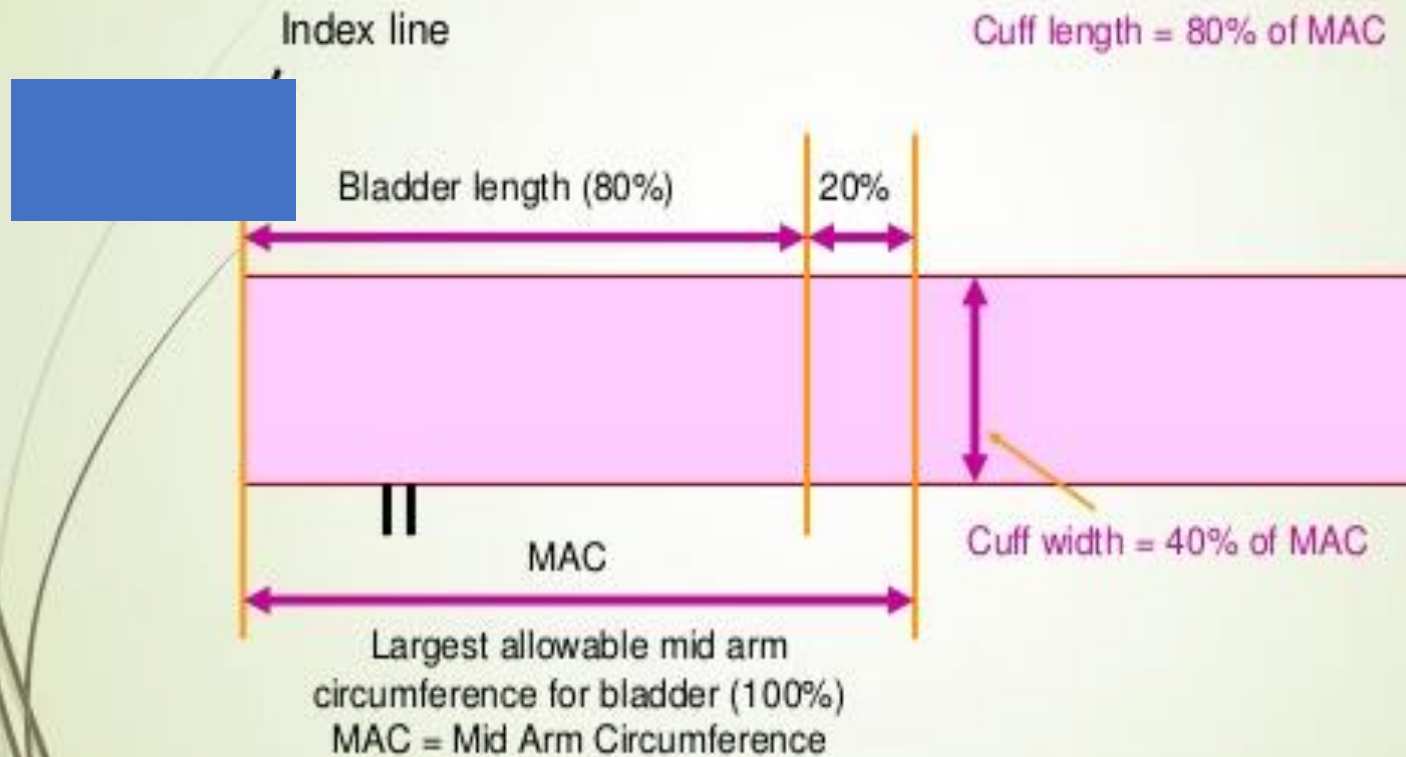
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Selection Criteria for BP Cuff Size

Arm Circumference	Usual Cuff Size
22–26 cm	Small adult
27–34 cm	Adult
35–44 cm	Large adult
45–52 cm	Adult thigh

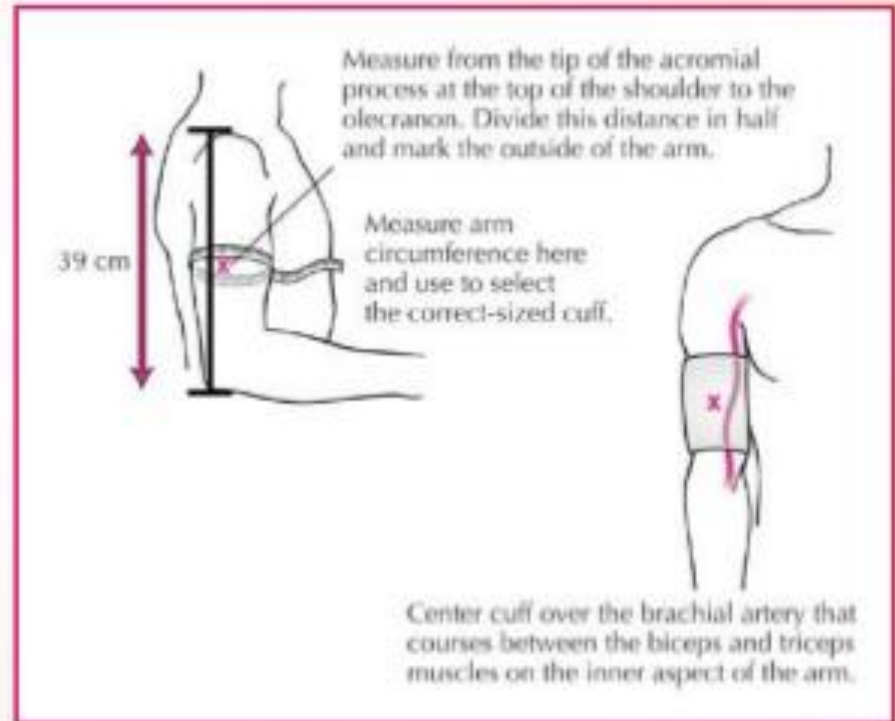
Blood Pressure Cuff Size



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Blood Pressure Cuff size

- Bladder **width** \geq **40%** of mid-arm circumference.
- Bladder **length** **80-100%** of arm circumference.



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Measuring accurate BP's

- ▶ Cuff too small → falsely high reading
- ▶ Cuff too big → OK reading or no reading (usually not falsely low)
- ▶ Lower extremities - Normally, BP is 10 to 20 mmHg higher in the legs than the arms
 - ▶ Prefer arm if at all possible
 - ▶ Right arm for comparison with standards

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Know your blood pressure by 

Measurement of Blood Pressure

- There are 3 basic ways to measure the blood
 - **Auscultatory.**
 - **Oscillometric.**
 - **Direct Method.**



What is being measured?

- ▶ **Auscultatory method:** relies on relationship between audible Korotkoff sounds and pressure at systole and diastole
- ▶ **Oscillometric method:** relies on the amplitude of oscillations in the arterial wall to determine MAP (maximum amplitude); complex and proprietary algorithms used to estimate SBP and DBP
- ▶ **Mean arterial pressure (MAP)** is average pressure throughout the cardiac cycle.

$$\text{MAP} = (\text{SBP}) + 2(\text{DBP}) / 3$$

Mercury sphygmomanometer



Aneroid BP monitor



Oscillometric wrist BP monitor



Ambulatory BP monitor



→ DINAMAP



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Aneroid Manometer

- ▶ Mercury pressure gauge replaced by mechanical spring
- ▶ Gauges are often small
- ▶ Accuracy varies among manufacturers
- ▶ Requires frequent calibration



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Oscillometric Devices



Measure mean arterial pressure (MAP) and calculates SBP and DBP

- ▶ The algorithms used are proprietary and NOT standardized
- ▶ Results can vary widely and they do not always closely match BP values obtained by auscultation
- ▶ These machines must be calibrated regularly

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Know your blood pressure by 

Ambulatory BP Monitoring

- ▶ Oscillometric or acoustic methods
- ▶ [REDACTED] monitoring
- ▶ Individual measurements not more accurate
- ▶ Readings downloaded into PC
- ▶ Cost: \$2500-4500



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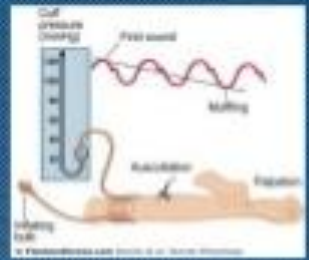


Confirming High BP's

- ▶ Repeat BP in both arms and one leg (both not usually necessary)
- ▶ Repeat 3 times to assure accurate
- ▶ Dx of HTN requires elevated BP's on 3 separate occasions

Self-Measurement of BP

- Provides information useful for:
 - assessing response to antihypertensive Rx
 - improving adherence with therapy
 - evaluating white-coat HTN
- Home BP is more strongly related to target organ damage and has better prognostic accuracy than office BP.

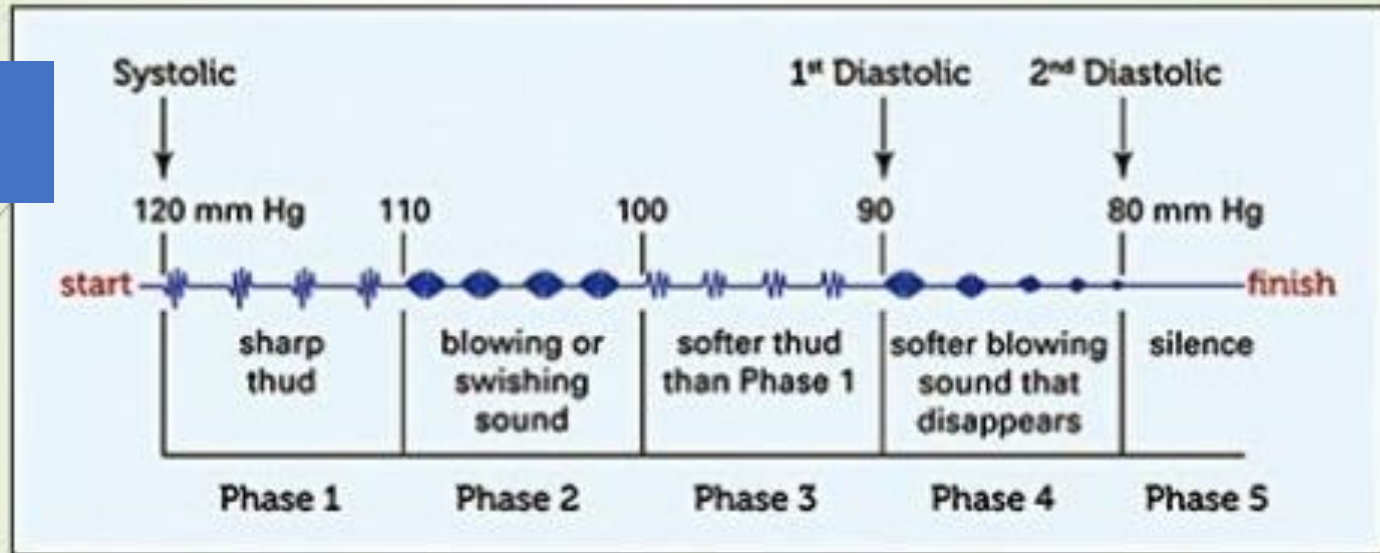


-The auscultatory method

- Involves listening to Korotkoff sounds using a stethoscope placed over the brachial artery in antecubital fossa of the elbow
- When:
 - Pressure (exerted by the cuff) much bigger than the pressure of the **systolic pressure** there is no blood flow, hence no sound
 - Pressure much lower than the systolic pressure this leads to blood forcing its way under the cuff for short periods at the beginning of the systole when the pressure is highest
 - Blood flow sounds are turbulent, and move in a high velocity. This causes the sharp tapping (1st Korotkoff sound) that can be heard (**systolic pressure**)
 - Pressure in cuff falls lower and lower the sound (lub-dup) becomes louder, then diminishes (you hear the change in sound from a tapping to a muffled sound and then thereafter to silence (this is the **diastolic pressure** / 5th Korotkoff sound)



Characteristics of Korotkoff sounds.



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BP Measurement Definitions

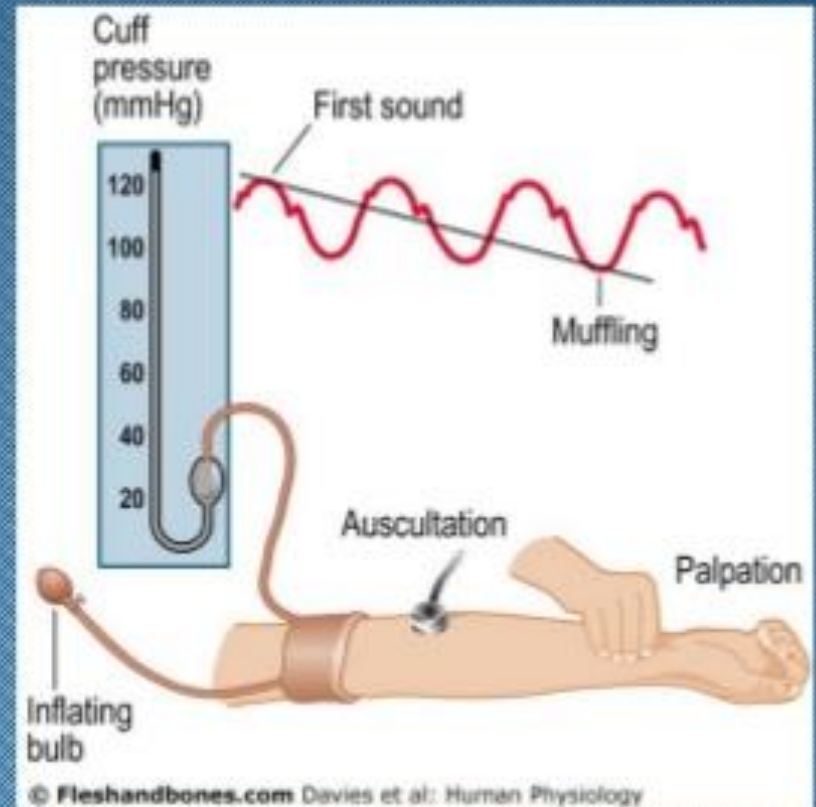
BP Measurement	Definition
SBP	First Korotkoff sound*
DBP	Fifth Korotkoff sound*
Pulse pressure	SBP minus DBP
Mean arterial pressure	DBP plus one third pulse pressure†
Mid-BP	Sum of SBP and DBP, divided by 2

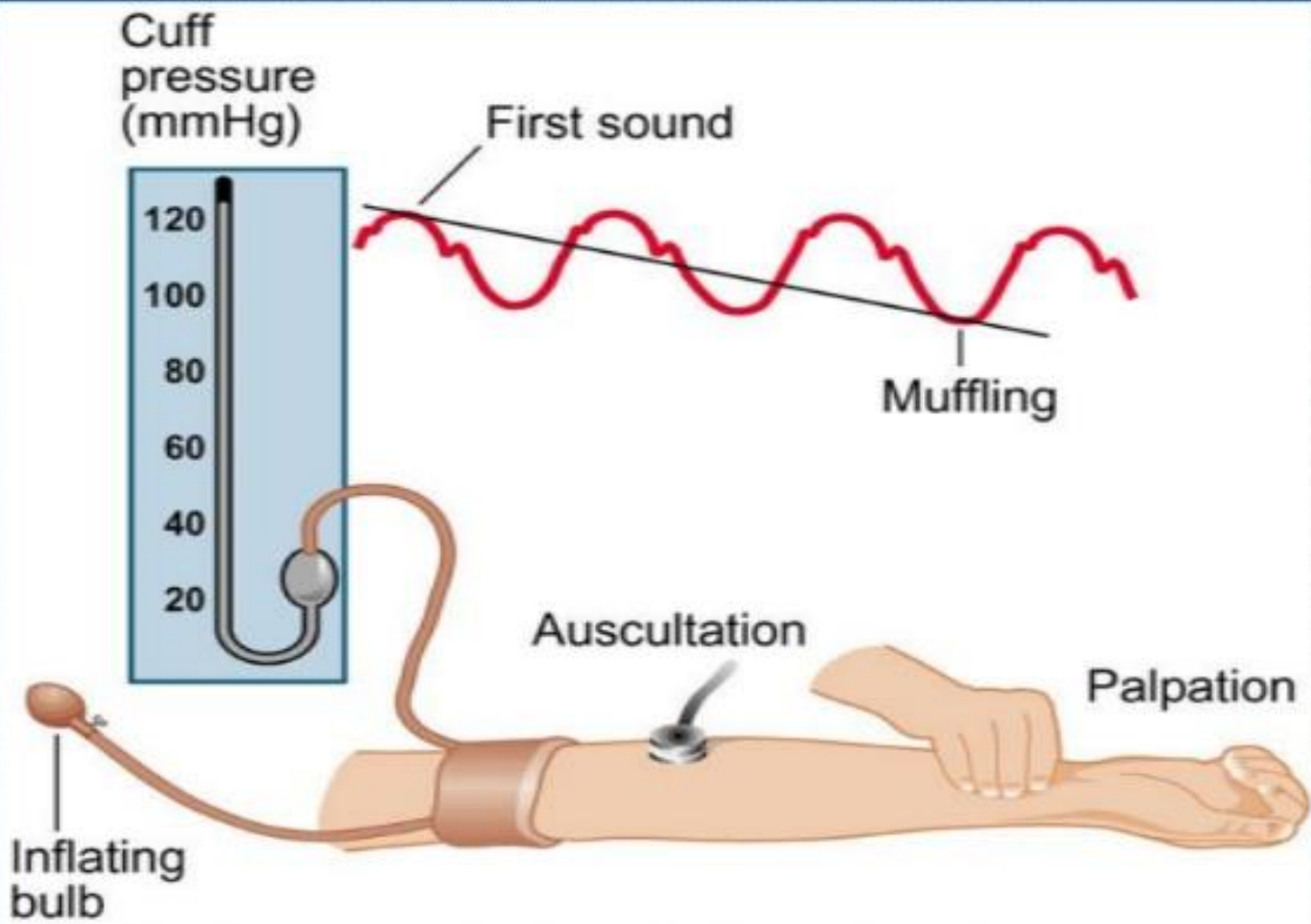
Recommendations for BP Measurement

- Allow patient to **sit for 5 min** before measurement
- Take **two readings 1 – 2 min** apart
- Patient should be **seated, back supported, arm bared and arm supported at heart level**
- Should not have **smoked, ingested caffeine-containing beverages or food in previous 30 min**
- **Repeated measurements in atrial fibrillation** and other arrhythmias to improve accuracy

How to measure systemic arterial blood pressure

- Let the patient be seated or lie down (document this)
- Using the left arm of the patient, determine the radial pulse
- Wrap the cuff around the left arm, above elbow at the level of the heart
- Inflate the cuff, keeping track of the radial pulse
- When the radial pulse cannot be felt anymore, you have an estimate of what the systolic BP is
- Place the stethoscope in your ears
- Deflate the cuff and pump the cuff 20 mmHg higher than the systolic blood pressure
- Slowly deflate the cuff again
- Listen to the beginning of the throbbing sound (systolic blood pressure) and the end of the throbbing sound (diastolic pressure)
- Repeat the procedure three times and determine a mean BP
- Readings are influenced if:
 - The cuff is too small (leads to the pressure not adequately transmitted to artery)
 - Cuff is not wrapped around the arm





CONVENTIONAL BP MEASUREMENT

CLINIC

TEMPERATURE

HUMIDITY

NOISE

OBSERVER

TRAINING

BIAS



SPHYGMO

HEIGHT

POSITION & TILT

LEVEL OF HG

CLOGGED VENT

MAINTENANCE

STETHOSCOPE

INACCURATE IN OVER ONE-THIRD OF PATIENTS IF NOT DONE CORRECTLY

Subject to White Coating

HEARING & VISION

DISTANCE

CUFF/BLADDER

CUFF CONDITION

APPLICATION

BLADDER SIZE

BLADDER POSITION

RIGHT OR LEFT?



RECENT EXERCISE

MEAL OR TOBACCO

OBESITY

ELDERLY

ARRHYTHMIA

POSTURE

ARM LEVEL

ARM SUPPORT

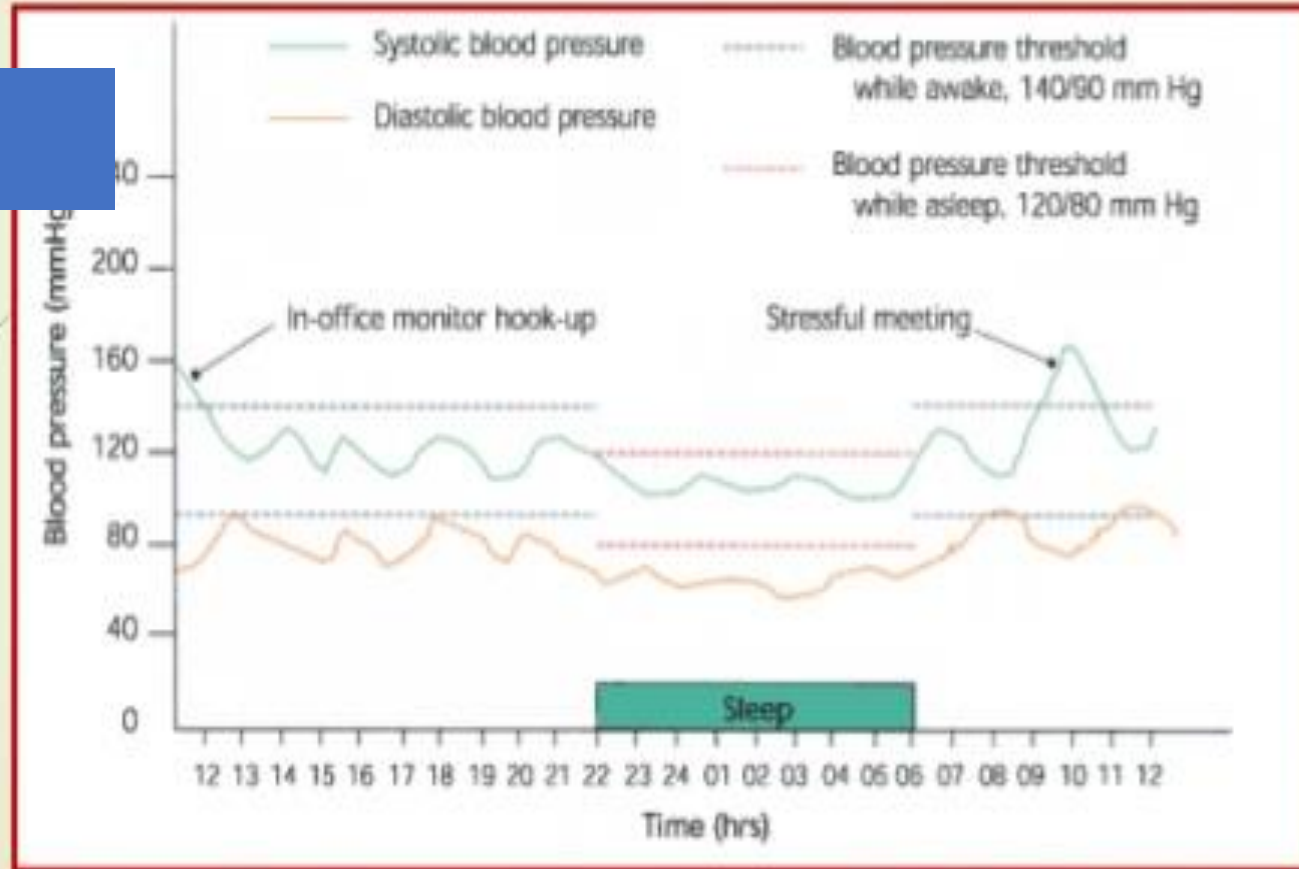
OUT OF OFFICE BP MEASUREMENT

- All guidelines recommend the use of out of office BP measurement to enhance accuracy
- Several recommend the use of Automated Office BP that closely correlates with daytime ABPM and TOD
- It is important to remember the differing norms



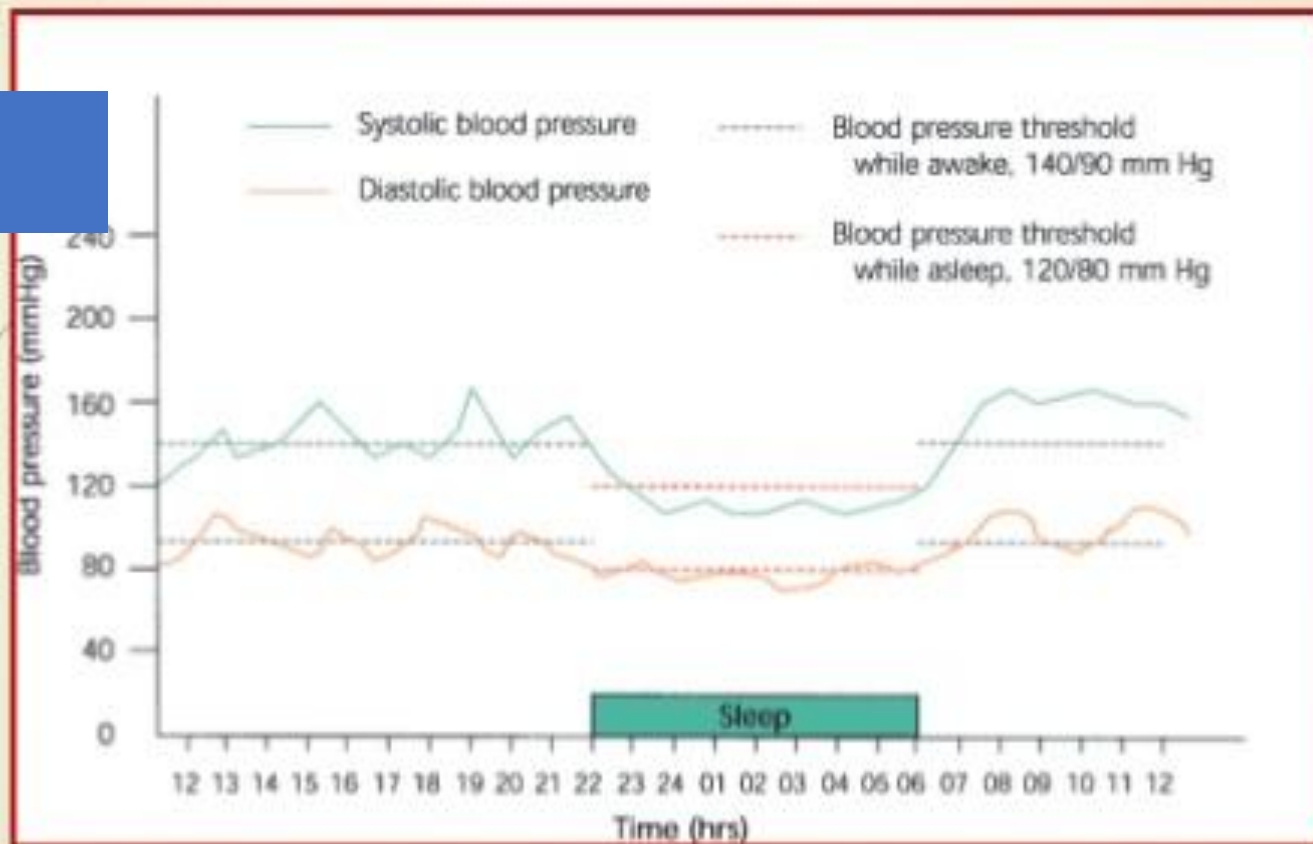
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Know your blood pressure by 

White Coat Hypertension



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Ambulatory Blood Pressure Monitoring



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Methodology / Technology

- www.stridebp.org
- Dedicated to providing guidance on accurate blood pressure monitoring
- Provides support on devices maintenance
- Free service

Acceptable Home Devices

- Microlife BPA3PC
- Microlife BP Home A
- Omron HEM 7201
- Visomat Comfort VEBE ECO




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Know your blood pressure by 

Acceptable office devices

- Microlife Watch BP office
- Microlife Watch office AFIB
- Omron 1300
- Dinamap Procure
- Omron HEM 907
- Welch Allyn Vital Signs



SAHS

Know your blood pressure by 


Validation protocols

- AAMI (Association for advancement of medical instrumentation)
- BHS (British Hypertension Society)
- ESH IP (European Society of Hypertension International Protocol)
- ISO (International Organisation of Standardisation)
- AAMI/ISO and AAMI/ISO/ESH

Acceptable Ambulatory Devices

- Microlife Watch BP
- Spacelabs 90207
- Schiller BR 102 plus



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Know your blood pressure by 



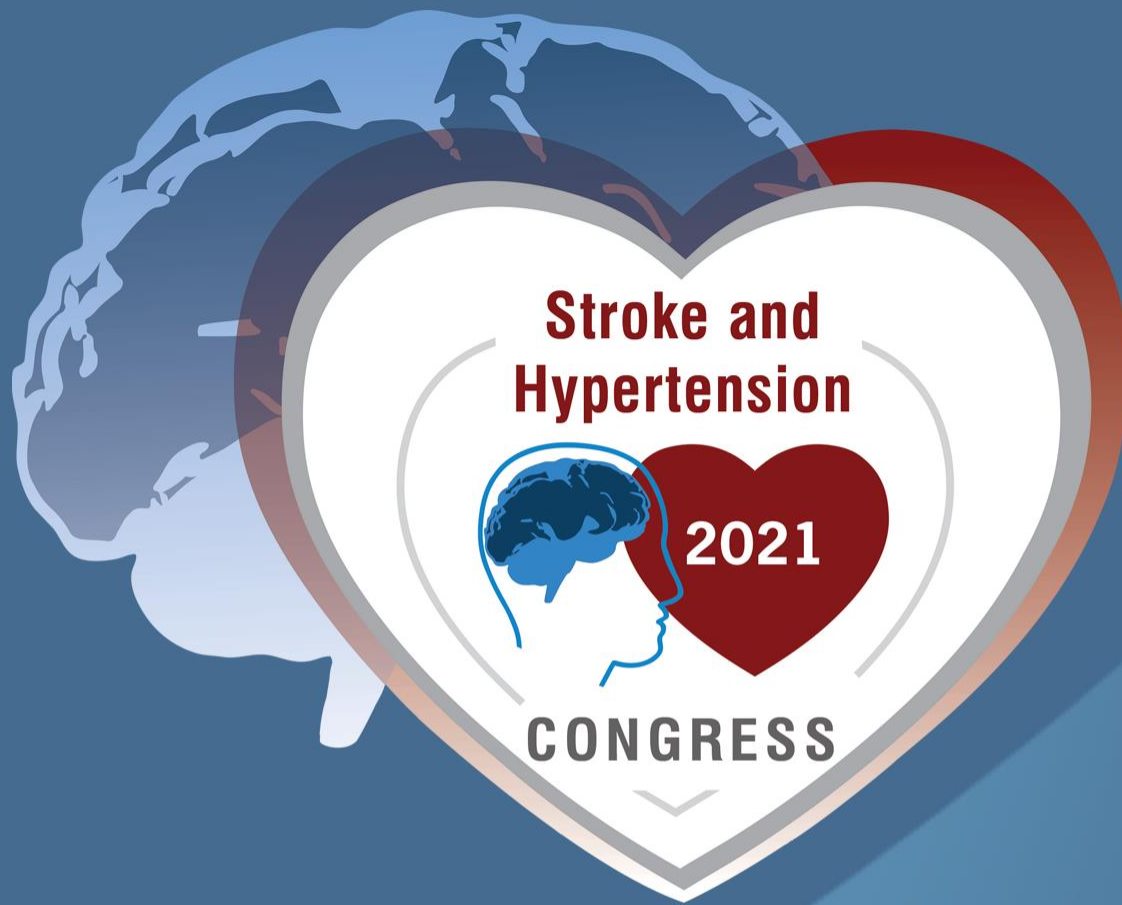
A SIMPLE MEASURE TO SAVE LIVES
#checkyourpressure



PARTICIPATE IN THE WORLD'S LARGEST FREE PUBLIC BLOOD PRESSURE SCREENING May Measurement Month 2020

- In just 3 years we have already achieved so much!
- **4.2 MILLION+** people have had their blood pressure measured
- In over **100 COUNTRIES**
- Visit <https://www.hypertension.org.za/> to Register





| SAVE THE DATE |

2021 - Gauteng

Become a SAHS member

www.hypertension.org.za

